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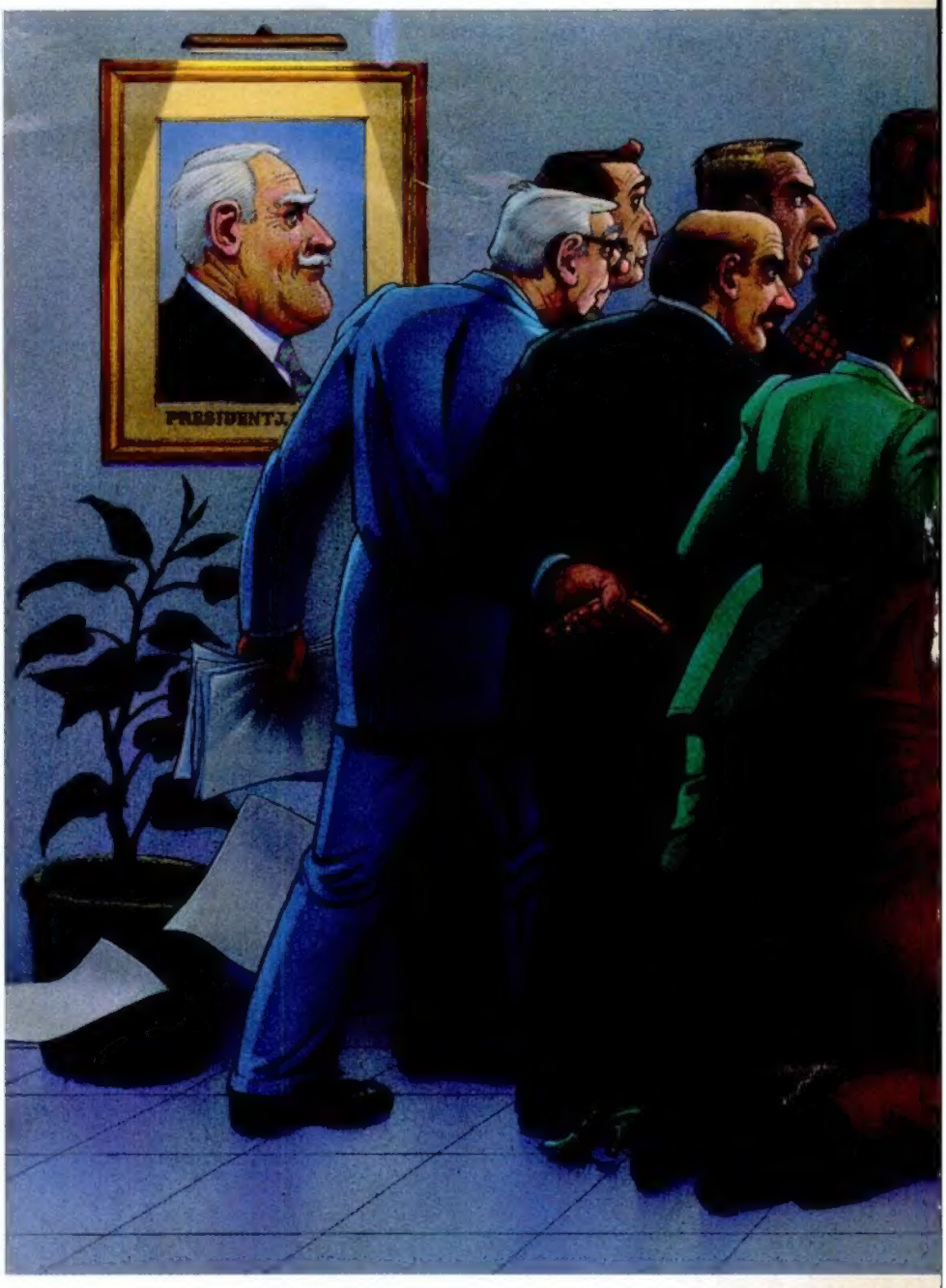
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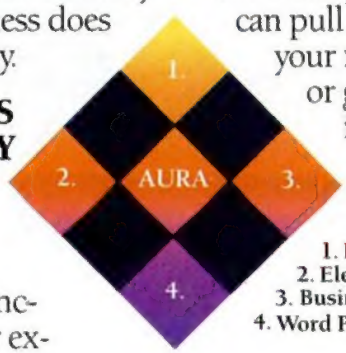
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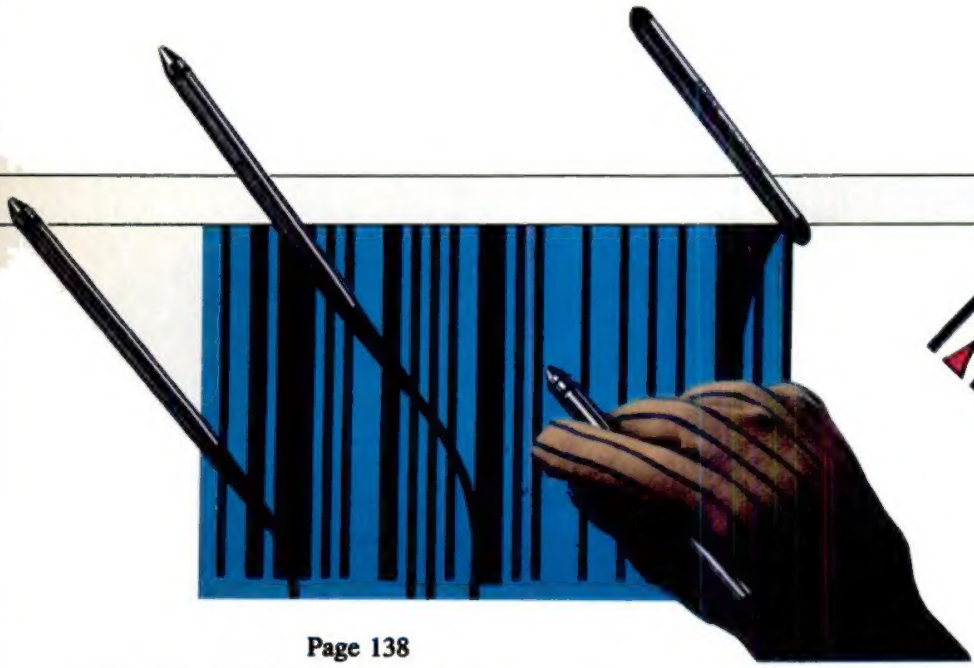
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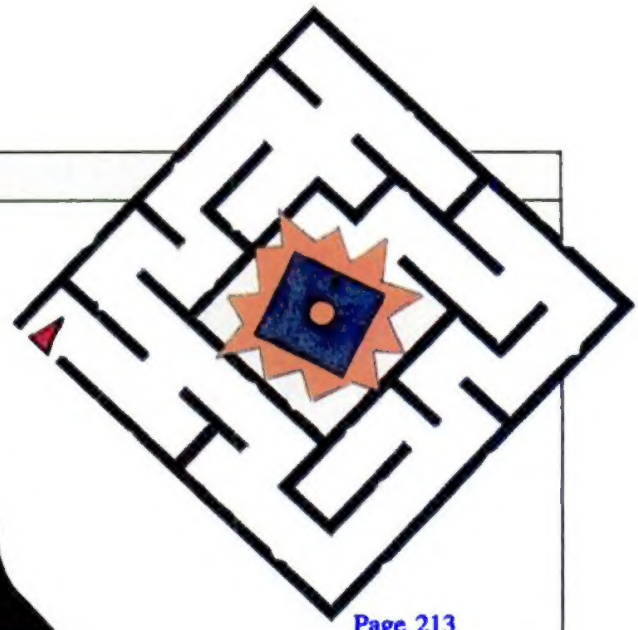
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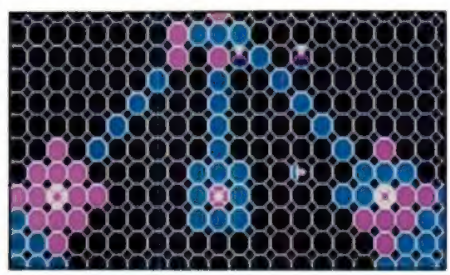
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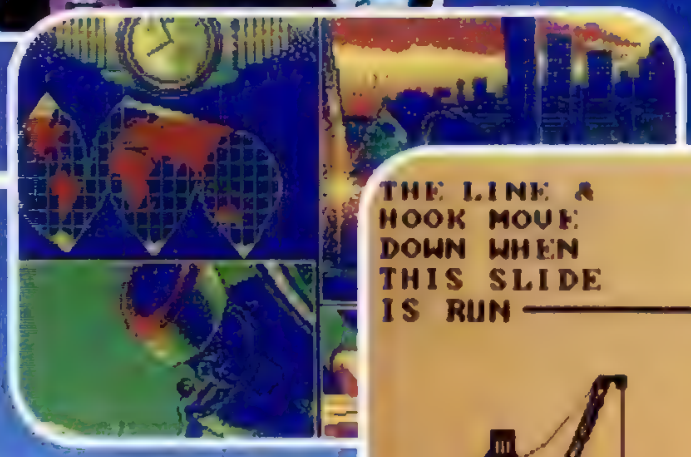
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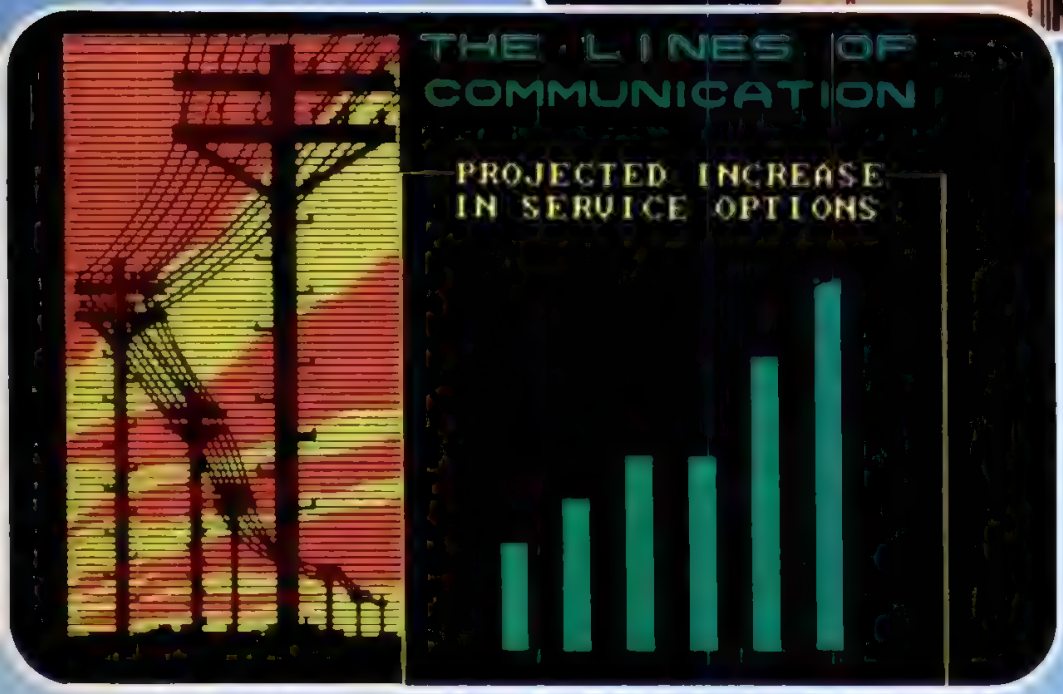


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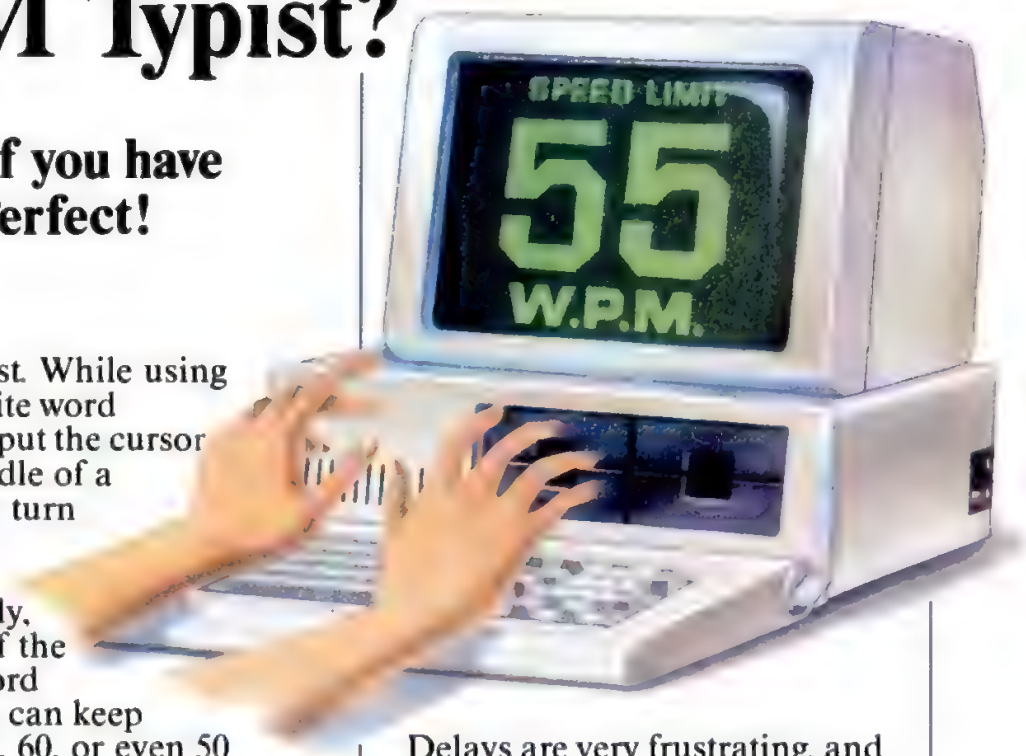
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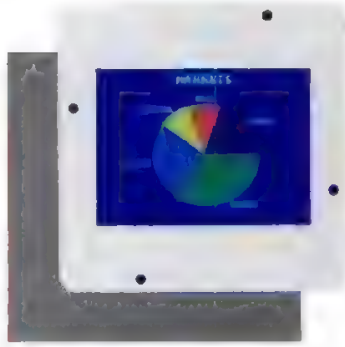
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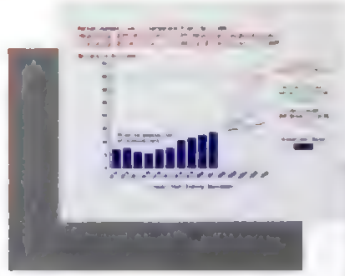
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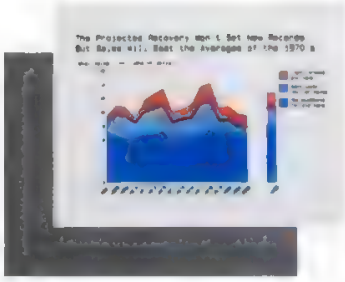
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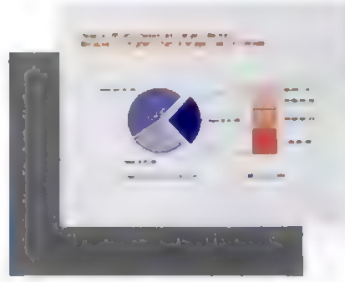
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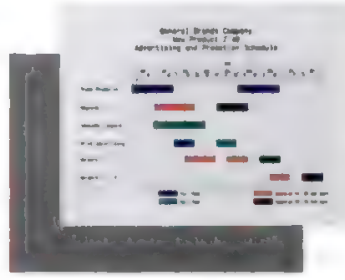












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8 line types
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8 fill patterns
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CIRCLE 219 ON READER SERVICE CARD



What's Inside

The staff of PC is a group of dedicated professionals who can't be distracted from their work—except perhaps by a charming 5-year-old or a sunny California day.

The members of the very serious staff of *PC* want to assure their readers that they are having no fun whatsoever—no matter what you may hear to the contrary.

We want to squelch a rumor that has been spreading through the industry at an alarming rate—that the *PC* staff *enjoys* taking apart microcomputers, playing with new software, and organizing scavenger hunts for new database packages. We are offended at this false and misleading story and wish to correct it immediately. The members of the *PC* editorial staff are a group of serious, hardworking professionals who have no time for fripperies.

For example, just a few weeks ago executive editor Mike Edelhart instituted a new *PC Magazine* efficiency test for the editorial staff. The details of this examination are, of course, classified. However, we can report that the major factor was the introduction into the office of Mike's 5-year-old daughter, Sally. If you really want to see how efficiently an office is run, simply drop a charming, intelligent 5-year-old into the works.

PC's writers are also consummate professionals and would never take part in an activity that wasn't necessary to their work. This is illustrated perfectly by at least two of the free-lancers who contributed to this issue's cover stories on alternate input devices.



Photograph: Dennis Chalkin

For example, Phil Wiswell had to prepare an article on joysticks, a topic that naturally required extensive research. "If you can run a complicated, fast-action game off a joystick, then it will work fine for all of your other applications," he said. "I tried maze games, I tried *Space Invader*-type games, I tried all sorts of different games—as many different kinds of action as I could think of." We are grateful to Phil for his sacrifice and dedication to the magazine.

Meanwhile, Tom Christopher was preparing his review of the D-Cam digitizing system. Originally, he had planned to couple a review of the D-Cam with one of a new CAD drafting tablet. Christopher reported on the difficulties that developed in his usual low-key, scientific way. "Three days of battling with a CAD system with the responsiveness and flexibility of a pre-war Buick left me ranting and slobbering like a rabid dog," he said. "Not to mention having to physically restrain Mike O'Cone from tossing $30,000 worth of equipment out of a seventh-floor window."

We also sent Christopher off to California to review the Datacopy Model 90 Digitizing System. He came back very impressed with the system, and the fact that he spent a couple of days in the sun-drenched vistas of California made no impression on him at all.

"It was a great place to go," Christopher reported objectively. "Clean offices, palm trees, green lawns. They have these torture chambers where they test the camera for temperature tolerance, and they told me, 'We really put it through all the rigors.' I expected to see temperatures of 20 degrees below, or 300 degrees above, or worse. It turned out they tested it down to 35 degrees and up to 110 degrees—which doesn't even meet the extremes of a typical New York City apartment."

This issue also contains the second part of our six-part database series. The very intense and serious manner with which the staff approached the series was exemplified by editor Bill Machrone when he went

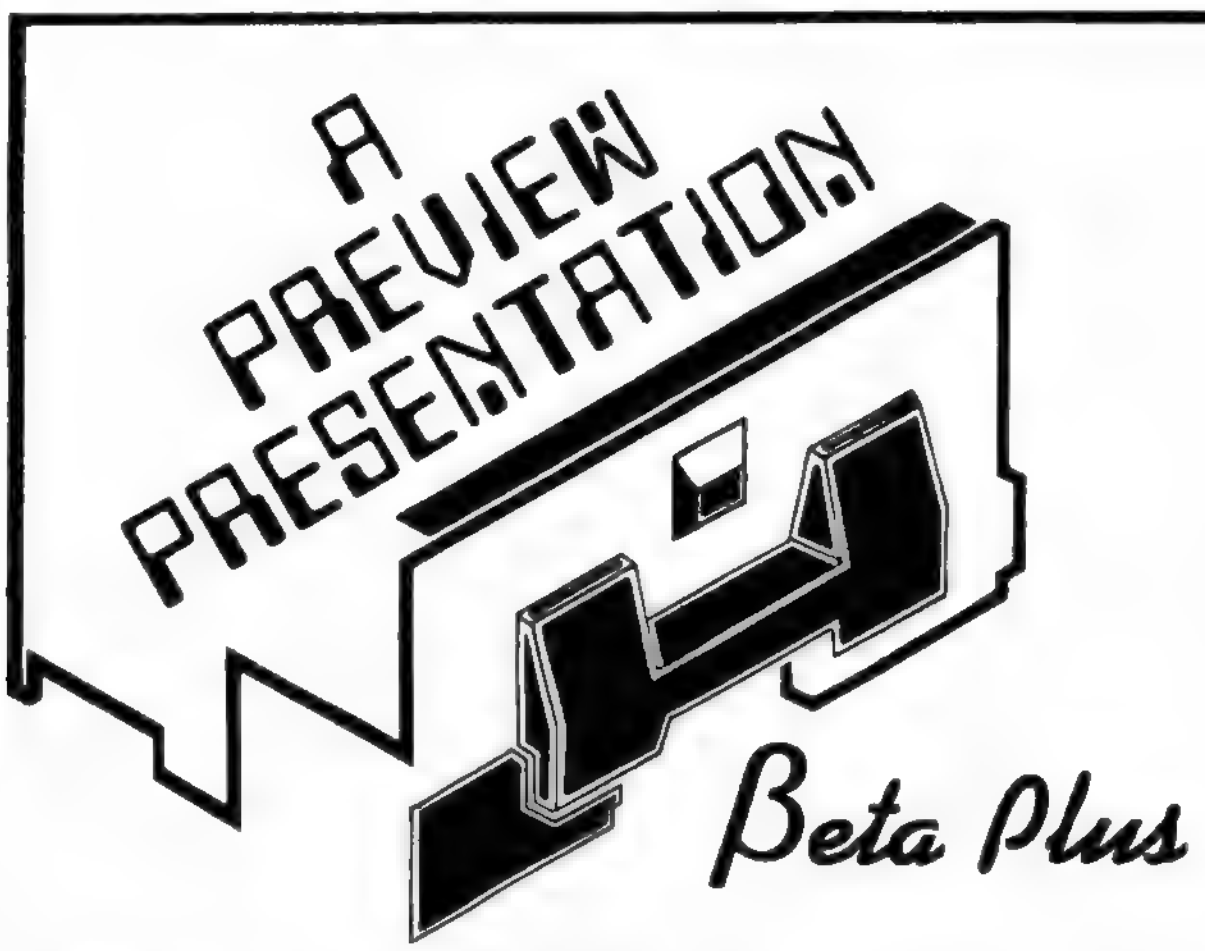
up to our administration offices to present the finished database information chart.

Machrone wanted to impress the publishers with the fact that the chart would need special handling in order to properly fit into *PC*'s format. He stood formally at one end of a long hallway with the 12-foot-long chart rolled into a tight cylinder and, with a flick of his wrists, sent the paper unrolling grandly down the aisle. Needless to say, his audience was impressed.

Taking their cue from the editorial staff, the database reviewers sent in a few well-considered and insightful comments of their own on the database package. Ed Joyce, who is represented in the package by his reviews of *Qbase* and *UltraFile*, wanted to know, "Are you bestowing awards to those vendors who supplied the most creative answers in response to the database questionnaire? If so, I have a prime contender. When I asked one distributor about export data capability, the representative proceeded to list the company's overseas distributors. Would this be considered a DIF, special, or programmable format?"

John Dickinson, who wrote the review of *A.I.M.* in this issue, contributed a tragic blow-by-blow description of his journey to disillusionment. "On the first day I was excited. Look at all these new toys to play with! On the second day I was busy. The first few products I tried were not without problems, but at least they ran well enough to do the job assigned. On the third day I was discouraged. Problems of the sort that keep software (and toys) from working—everything from missing parts to broken parts—began to crop up. On the fourth day I renamed my office 'The Bit Bucket.' Many of the missing parts were not forthcoming and the vendors declared some of the broken ones correct or irreparable. All I could think was, 'It's a damned good thing it wasn't my money,' because much of it would have been down the tubes."

We hope that the above information supplies convincing evidence of the manner in which *PC Magazine* approaches its subject. After all, microcomputers are a very serious business—an opinion with which the majority of our readers (especially those who keep copies of Air Traffic Controller on their hard disks "for diagnostic purposes") will undoubtedly agree. ■



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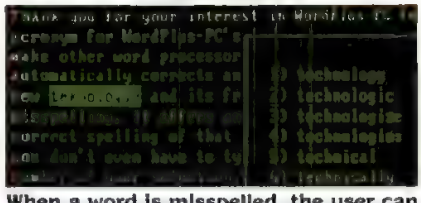
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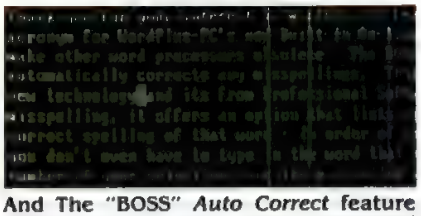
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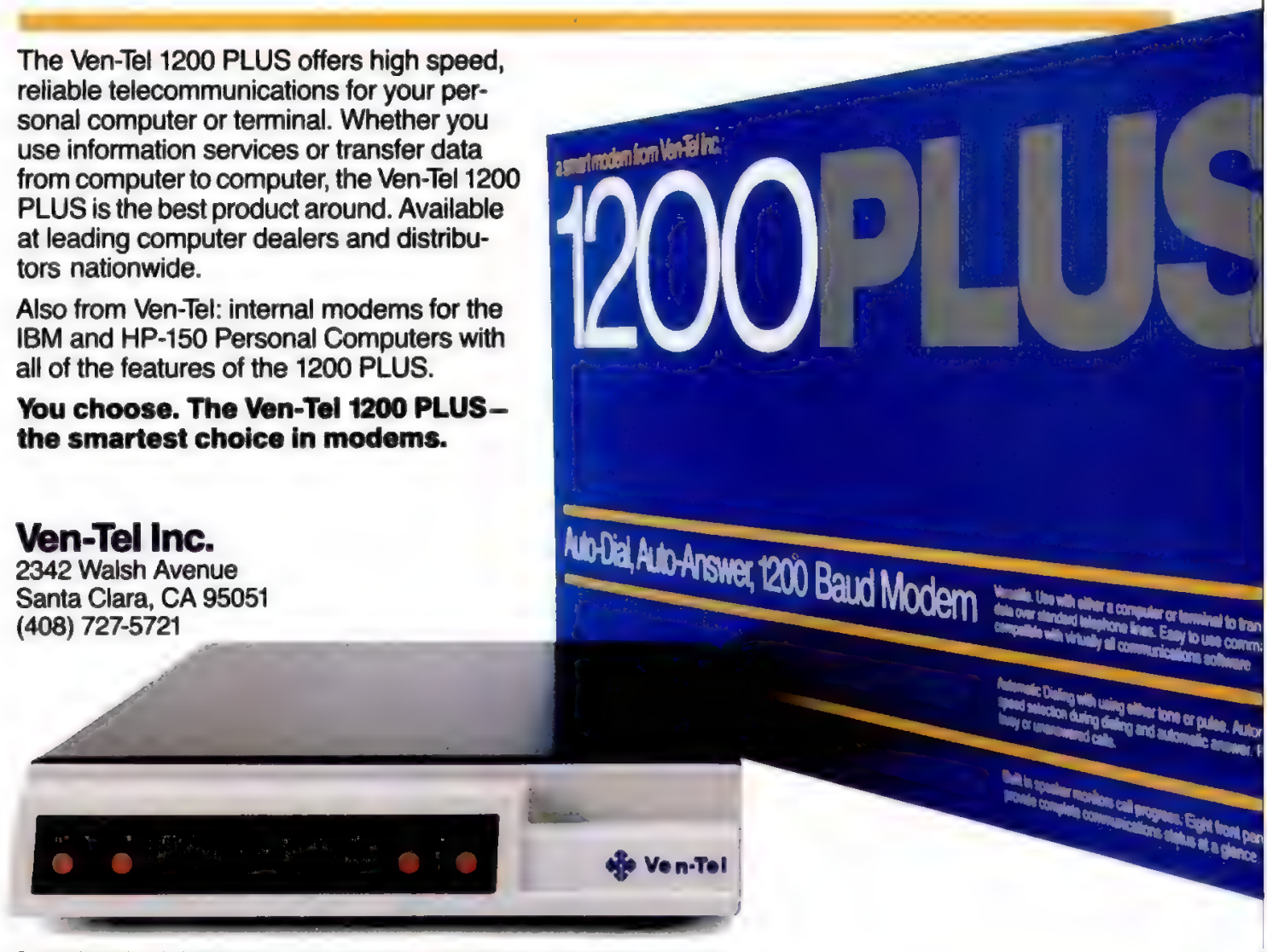
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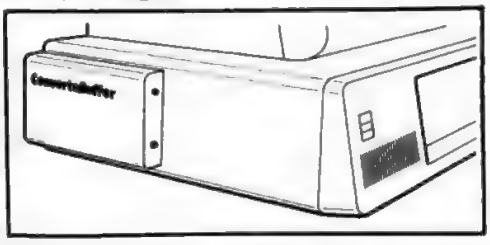
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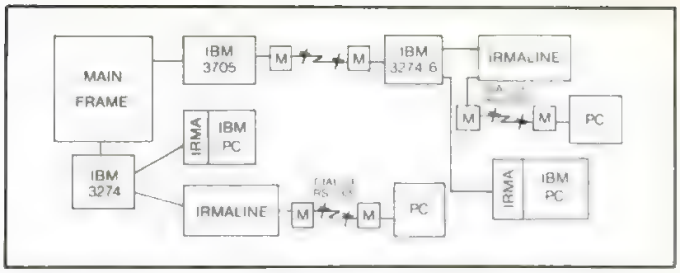
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CIRCLE 117 ON READER SERVICE CARD

IBM Personal Computer Trends and Developments

IH News

FROM THE EDITORS OF PC

JUNE 26, 1984

Will Desq Top Windows?

Quarterdeck's $399 colorful office Desq simultaneously runs existing applications under DOS in new integration approach

BY JAMES LANGDELL

SANTA MONICA, Calif.—Now there's a colorful window system that doesn't close the door on programs you already use. *Desq*, a "multi-window software integrator," is finally available from Quarterdeck Software, a southern California company. Like most window software systems, including Visi On and Microsoft *Windows*, *Desq* arrived several months later than expected (a sneak preview of *Desq*, "Through an Open Window," appeared in *PC*, Volume 3 Number 7). But now the package is complete—ready for a long career of being unfinished.

Unfinished? Yes—in a good way. *Desq* users don't have to fill its windows with specially tailored applications programs, in fact, Quarterdeck doesn't make any. Instead, *Desq* is designed to accept most existing MS-DOS-compatible programs, including the widely-used *1-2-3*, *dBASE II*, *VisiCalc*, and *WordStar*. And Quarterdeck claims its system is so open that you'll be able to fill its windows and menus with most yet-to-be-conceived programs, including ones you write yourself.

Desq lets you combine your choice of up to nine software packages in an environment that lets you use them—individually and together—with greater ease and power. Quarterdeck's goal was to enable a user with no special programming skills to customize the PC's software into a single tool, fitted to his or her work needs.

Indeed, anyone ready to use *Desq* (list price $399) has a powerful set of hardware tools in the first place. To run *Desq*, you need PC-DOS 2.0, a hard disk with at least 5 megabytes, 256K RAM for *Desq* alone, plus the RAM needed by the most memory-hungry program you might put into *Desq*'s windows. You can use a color or monochrome display. All operations can be performed with a keyboard, although an optional mouse can be used with *Desq*—even within some applications that weren't originally designed for mice. (*Desq* handles Logitech, Microsoft, and Mouse Systems mice of either the two- or three-button breed.)

One factor that bodes well for *Desq*'s quality is that its creators

(continued)

IBM's First Industrial PC Takes Aim at Factories

5531 Computer, dressed in battleship gray, is a tougher, more expensive XT

BOCA RATON, Fl.—The latest PC from IBM is the 5531 Industrial computer, a more rugged version of the PC-XT. The new machine, painted an uncharacteristic gray, is aimed not at offices but at "the factory of the future," or, in the words of IBM spokesperson Dan Scherer, the "computer-integrated manufacturing system."

The new XT housing was developed by the industrial computer products group at IBM's Manufacturing Systems Products business unit, neighbor to the PC-producing Entry Systems Division in Boca Raton. The 5531, scheduled to ship by year's end, is the first PC-based product from the Manufacturing Systems unit.

"Functionally, the machine is an XT, but this is more than just a cosmetic change," says IBM's Scherer. An extra fan and vents should keep the machine cool as it tracks production data on the factory floor, but a thermal sensor on a built-in adapter card will shut down the computer if it gets too hot. The 5531's power supply is protected against sudden voltage surges and drops as



large machines in the factory are turned on and off. Special bracing inside the system unit keeps boards from moving around with shocks or vibrations; the keyboard innards are shielded from floating dust by an extra membrane.

The basic system—system unit and keyboard—sells for $6,740, compared to $5,000 for the standard PC-XT. The optional 5532 industrial color display, shielded by a plexiglass panel, adds $850. The 5531 and 5532 will be sold by IBM's National Accounts and National Marketing divisions. ■

Desq *(continued)*

learned from past experience with a prototype workstation for managers. Several key figures at Quarterdeck, including founder and president Therese Myers, came from Axxa Corp., which developed a multipurpose workstation for the banking giant CitiCorp in the late 1970s. The proprietary Axxa hardware was built around 8086 processors similar to the 8088 used in the IBM PC.

Citicorp executives wanted a variety of simultaneous functions at each station: a phone index and a notepad, for example. In concept, the Axxa system was for every level of employee from data entry clerk to vice president. In practice, however, middle managers made the most use of personal workstations, according to Myers.

She observed that managers usually do integrated tasks, such as analyzing information about a project to create a progress report, and that their work is frequently interrupted. Traditional computer systems were only suitable for repetitive, "single-threaded" work, so Citicorp managers welcomed a workstation that gave them enough control to interrupt one task, handle another, and resume the first.

The managers' demands, however, ultimately pushed the Axxa system beyond its limits. "Many of the users were up on the latest things in personal computing," says Myers. But the Axxa system was too closed and inflexible to keep up with what they wanted. "We had to tell them, 'No, we can't add *VisiCalc*.'" It was a case of the system developers always playing catch-up with the users.

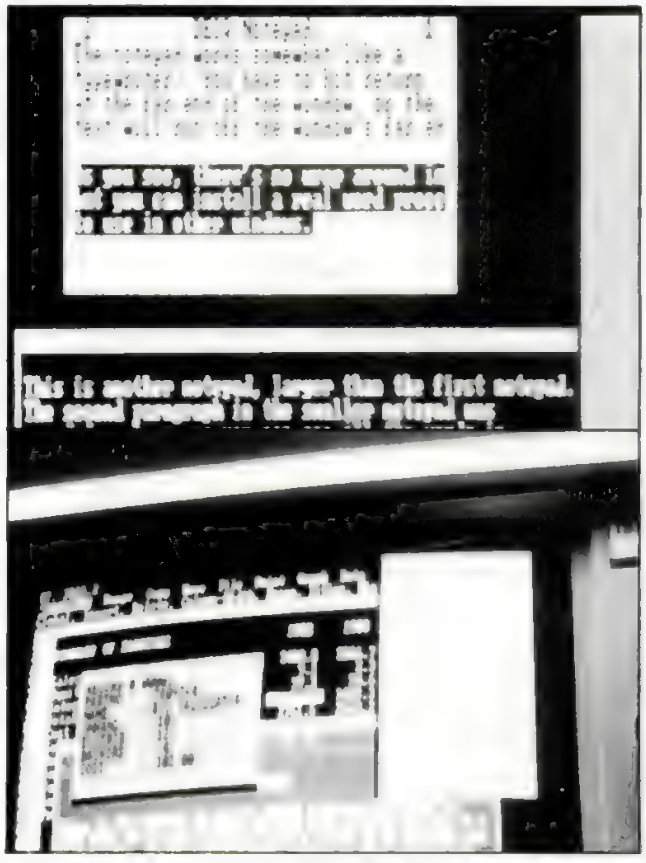
"The managers couldn't get into the system to customize the functions they used. Even something as simple as a request to 'Move this column over to the other side of that column' had to be handled by a programmer." Usually these details aren't fully appreciated until the person who will actually use the system starts to work with it.

Axxa Inspiration

The Axxa experience convinced Myers that end users needed the ability to customize a system. The requests for *VisiCalc* and other applications taught her that "a product needs to be intelligent enough for other software to run on top of it."

Myers and others working on Axxa were aware of projects at Xerox's Palo Alto Research Center, including Alan Kay's Dynabook concept and the Smalltalk language. "Then we saw a Xerox Star computer system installed at the White House," Myers says. Seeing the multiple windows on the Star's screen convinced them that windows were the way to go for a multifunction system.

After they left Axxa Corp. Myers and others, including Gary Pope (now Quarterdeck's executive vice president), spent 9 months developing software for *Desq*. They wanted to use Smalltalk with their system, but failed to get approval from Xerox. Instead, Pope developed *Simple*, a language based on Smalltalk and LISP, which was used as an internal development tool for *Desq*.



After *Desq* was up and running in October 1983, Quarterdeck did extensive testing, fine-tuning its software environment to be compatible with as many existing MS-DOS programs as possible. "We even ran Visi On in a *Desq* window," claims Myers. Quarterdeck claims *Desq* works well with programs that stick to the rules of PC-DOS and BIOS calls, and not so well with programs that deal directly with hardware for memory, screen, keyboard, and file management.

Within the Windows

Desq's own commands and processes are easy to learn and use. Menus list available commands, which can be selected by pointing at the command with a mouse cursor or by keying in one or two characters that are listed on the menu. From the keyboard you can enter a series of commands without waiting until the menus that list them appear. This arrangement lets you use the system faster as you learn more about it, but there are reminders available whenever you need them.

With *Desq*'s menus and commands, you can open and close each window; change its size, position, and color; and save or print its contents.

When you have several windows on the screen, you choose which one is active by tapping the Alt key (redubbed the *Desq* key) and pressing the number key corresponding to the number in the upper left corner of that window. (In *Desq* operations, you always tap the Alt key rather than holding it down while pressing the desired key. That was Quarterdeck's way of avoiding conflict with programs that used the Alt key in the traditional way.)

A zoom feature makes one window fill the screen when you tap Alt and press the Z key. The window returns to its previous place on the screen when you tap Alt and press Z again.

(continued)



Therese E. Myers

Desq *(continued)*

While you're using an applications program in one window, you can tap Alt once to call up a menu of commands for that program. Quarterdeck provides a disk with a library of "Agent Support Package" files that link *Desq* with 12 popular programs and create command and help windows that automatically enhance these programs. The *Desq* manuals provide users with thorough instructions for adding these features to other programs.

Added Benefits

If you tap Alt twice, the program's own menu disappears and the *Desq* main menu takes its place. Through commands on the *Desq* menu you can copy material from one window into another, even if the two windows are running different programs. You can also call up a File and Print directory, which lets you perform most of the PC-DOS level file operations with improved sorting and marking features, and load files into the PC-DOS 2.0 print spooler—even from programs that weren't designed to use this spooler.

The Learn function in *Desq* lets you create new commands. While working with *Desq*, you can select Learn from the *Desq* menu just before you begin an extensive operation. Learn will then record a "script" of everything you do, even if you switch between different windows and different programs, until you tell it to stop. If you give that script a one or two character name and identify it on a menu, it becomes a new, customized command, ready to use the next time this same task comes up. (A similar feature was planned for Visi On, but was not included in the finished product.)

In the marketplace, Quarterdeck's *Desq* faces stiff competition from Microsoft's and VisiCorp's heavily promoted window environments, but it has the potential to hold its own. Users should find this environment package as attractive as the applications they already like—and *Desq* doesn't force its suitors to give up their old affections. ■

Diego Rivera: Cubism at IBM Gallery







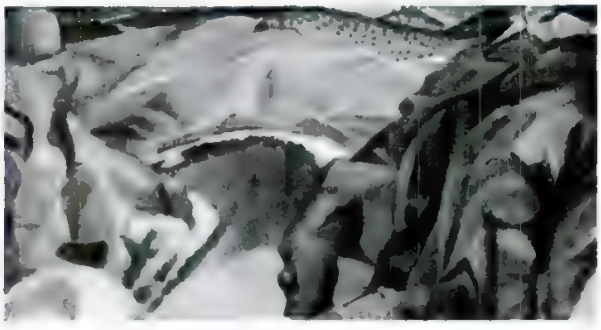




NEW YORK—Diego Rivera is best known for his large, often controversial murals depicting the life, politics, and social conditions of working class Mexicans in the early twentieth century. His less-well-known works, however, include his Cubist paintings and drawings done as a young artist living in Paris, where he was influenced by great Cubist artists such as Pablo Picasso.

Diego Rivera: The Cubist Years, an exhibit of works from his 4-year developmental period of Cubist painting (1914–1917), will be shown at the IBM Gallery of Science and Art in New York City. Developed by the Phoenix Art Museum, the show features over 70 of Rivera's works and will run from June 12 through July 28, moving on to San Francisco and Mexico City.

Admission to the IBM gallery at 590 Madison Avenue is free; it is open Tuesday through Friday, 11 a.m. to 6 p.m. and Saturdays 11 a.m. to 5 p.m. The gallery will be closed during August and September. ■



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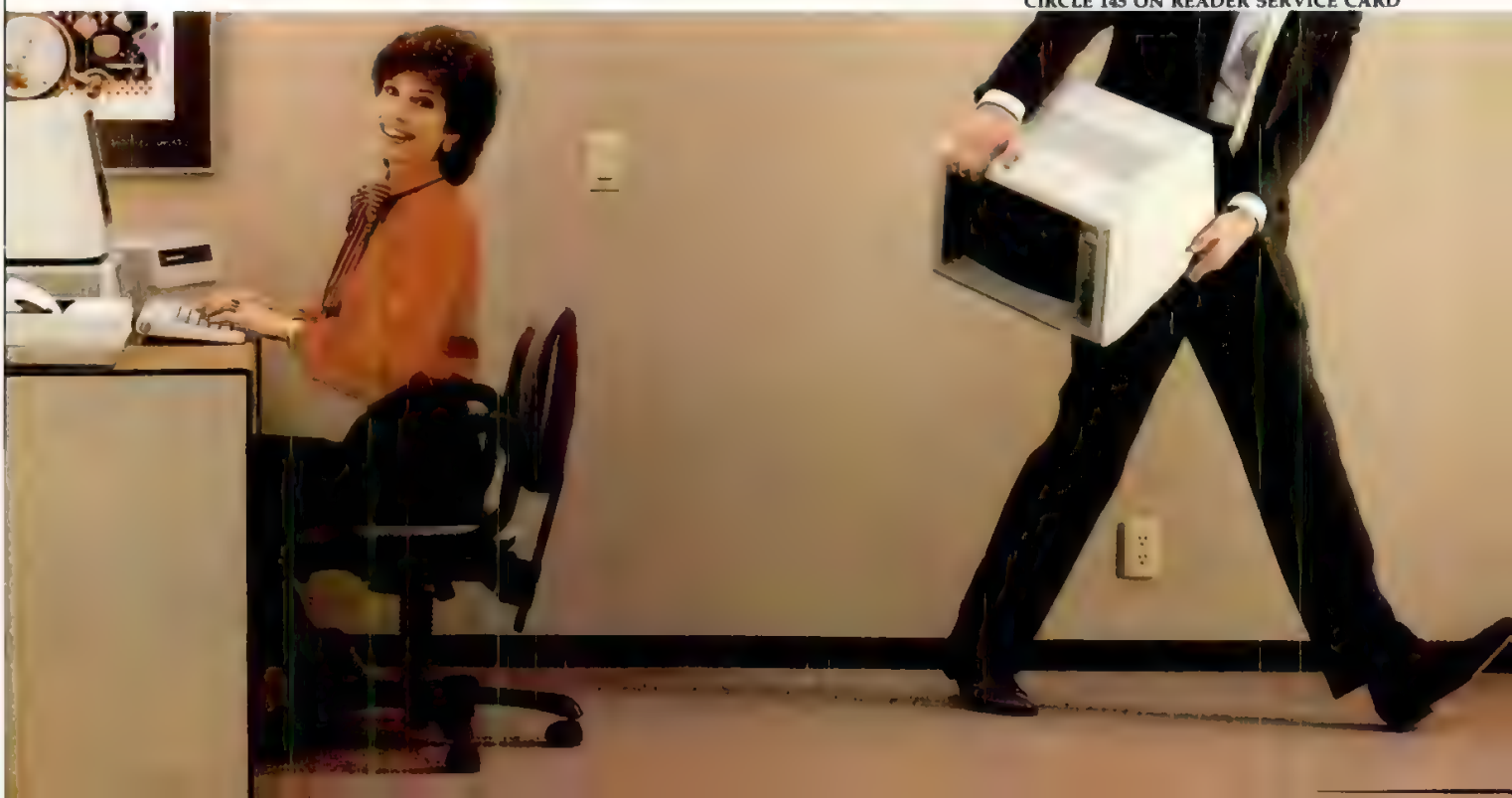
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Digital Research Ties CP/M, DOS

Concurrent PC-DOS is latest attempt to capture PC operating system market

BY KAREN COOK

MONTEREY, California—Digital Research, Inc. (DRI) and Microsoft are at it again. The two companies have been scrambling against each other ever since IBM selected Microsoft's MS-DOS over Digital's CP/M as the operating system for the IBM PC.

Now Digital Research is preparing to release Concurrent PC-DOS, a new version of Concurrent CP/M that runs MS-DOS programs under a new PC-Mode and uses DRI proprietary windows with one feature that Microsoft doesn't offer yet—concurrency.

With Concurrent PC-DOS, product manager Kevin Wandryk said, users will be able to run four 16-bit programs, four PC-DOS programs, or any combination of the two. The dominant part of the new operating system is CP/M, but the PC-Mode facility lets users switch back and forth from CP/M to PC-DOS without rebooting the operating system.

Microsoft's Weak Spot

Concurrency, or multitasking, might be called Microsoft's window of vulnerability. With Microsoft's announced *Windows*, users can view a number of different software applications on one screen—but only one of the windows is actively working at any one time. In contrast, Concurrent CP/M with Windows can perform and display up to four different processes simultaneously: A user might compile a program in one window, print a file from another, run a calendar in a third, and draft a letter in the last.

Microsoft's *Windows* package, announced last November, is still not in stores. Digital Research has been shipping Concurrent CP/M with Windows for the world's overlooked 16-bit CP/M machines since January; in theory, the release of a concurrent product for the MS-DOS world will represent an important increase in capability for the PC.

The prototype for the retail version of Concurrent PC-DOS is Concurrent DOS (also known as Concurrent CP/M Release 3.1), a product Digital Research has shipped to more than 40 original equipment manufacturers (OEMs) since March. Concurrent DOS, which offers PC-Mode and windows, can be linked to several standard local area networks (LANs).

Concurrent DOS can also be configured to support more than one user at a time. According to product manager Wandryk, DRI may include the multi-user facility on the version of Concurrent PC-DOS released in July. "We are considering having a second user supported off one of the serial ports of an IBM PC," he said.

IBM PC expert Peter Norton thinks multitasking and multi-user capabilities are more than the PC was meant to handle. "It's like turning a passenger car into a dumptruck," he remarked.

What's in a Name?

The PC-DOS name in a Concurrent CP/M-based product sets this CP/M operating system apart from the other 16-bit operating systems in the Digital Research family. Contrary to popular belief, IBM never registered PC-DOS as a trade name, so DRI needed no official approval for its IBM-specific product name. Even so, Digital Research trod cautiously in the shadow of IBM's big stick. "IBM knows what we have done, but to say that IBM has actually authorized it would be stating things that I'd rather not state at this time," said Wandryk. "I'm more concerned with a relationship with IBM than with the legalities."

DRI may be angling for marketing support from IBM, some industry watchers speculate. At present, DRI plays a weak second fiddle to Microsoft in IBM's distribution channels. IBM Product Centers sell DRI's CP/M operating system for the PC, for example, but for $240, $180 more than IBM charges for PC-DOS.

What is the market for Concurrent PC-DOS? "The market is huge—practically anyone who wants to use PC-DOS," said Esther Dyson of EdVenture, a highly regarded industry newsletter. But she warned that the product's success will depend on DRI's ability to promote it. "DRI is a super technology outfit, but its marketing has frequently been ineffective," Dyson said.

"Initially, the people who buy Concurrent PC-DOS are going to be a little more technically sophisticated than average and have a bigger machine. The ideal person would be somebody with a hard disk machine such as an XT, with 512K," Wandryk said.

Not Quite Perfect

Despite its name, Concurrent PC-DOS is not perfectly compatible with the PC, Wandryk said. DRI's PC-Mode may have problems running PC-DOS programs that bypass the operating system to address specific memory locations in IBM's proprietary hardware.

Furthermore, the PC-Mode is compatible only with DOS 1.1, which means that it can't read anything beyond the root directories in DOS 2.0, the operating system designed for the PC-XT. "I see that as a limitation; we're looking for things for 2.0 down the road," Wandryk said.

For the time being, users are still waiting for the complete version of Concurrent PC-DOS (1.1), which is being released in stages. Concurrent CP/M with Windows retails for $350 and comes with a coupon for the free PC-Mode upgrade that may be redeemable in July. Once the PC-Mode software is ready, Concurrent CP/M with Windows will be upgraded and relabeled as Concurrent PC-DOS. At that time, it may also acquire a new, probably higher price tag. There will be no price break on Concurrent CP/M with Windows or the PC-Mode for people who already own other 16-bit CP/M operating systems. ■

OptionWare Offers Applications Options

BLOOMFIELD, Connecticut—Business PC users can dress up Lotus' *1-2-3* with OptionWare, a new applications software series from DSS Development.

"The top-selling programs are in essence end-user application generators. They give you a tool to produce an end result as opposed to producing the end result itself," says DSS Development's president Ian Boyd. The problem, Boyd says, is that "managers don't have time to generate their own overlays."

To help executives, DSS is marketing a collection of software applications that work with *1-2-3*. So far, 52 OptionWare programs are available in nine categories. Under Personal Organization, for example, DSS offers bank account reconciliations, credit card report, monthly calendar, and reservations and appointments packages.

All OptionWare programs use the same five commands: ENTER, DISPLAY, VIEW GRAPH, PRINT, and SAVE. The OptionWare keys deliver instructions to *1-2-3*, so users don't even need to learn how Lotus' program works, Boyd claims.

OptionWare requires 320K RAM, a graphics board, and two disk drives. Lotus' *1-2-3* runs in drive A:; the OptionWare disks, which cost $130 each, run in the B: drive. ■

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IBM, DRI Focus On Optical Discs

BY MARTIN PORTER

NEW YORK—IBM is eyeing optical storage.

Industry reports place Big Blue in negotiations for "sizable" quantities of Sony model CDP-101 Compact Disc (CD) players. These first-generation CD turntables, which are turning audiophiles' ears on to digital audio, could also prove to be cost effective and expansive storage drives for future IBM software products.

Compact Discs can carry over 550 megabytes of information on each side and can also be encoded to provide still video images. Optical disk technology alone won't solve the software copying problem—but it will mean that pirates will have to make a bigger investment in a laser duplicating system. Meanwhile, CD players themselves are programmable and also can be modified to contain an I/O port for computer control.

Sources at Sony confirmed that CD-related talks between its Tokyo offices and IBM have taken place, but it was termed "unlikely" that an announcement would be made even if a sale were consumated. Sony is barely supplying all the CD players it can manufacture to existing consumer audio dealers.

IBM has apparently been considering some CD applications for at least the past year. Audio writers attending an industry trade conference last fall at the N.V. Philips corporate headquarters in Eindhoven, the Netherlands, learned that IBM had placed an order for 300 of the company's low-cost Magnavox FD-1000 CD players. Philips codeveloped the Compact Disc with Sony and owns its license.

Until recently, the CD has been overlooked as a potential storage partner for micros in deference to the larger storage capacity (about one gigabyte) and moving pictures of optical videodisks. Both mediums are laser-read, and Pioneer has in fact released a programmable player in Japan that can accommodate either format.

Because there's no way yet for users to write onto these disks, optical technology won't make floppies obsolete. CDs are suitable for reading programs into the user's system, or to store read-only files. The price of CD players is rapidly dropping below $400 retail, compared to videodisk players, which are currently priced from $700 to $800.

(Sony already supplies the 3½-inch microfloppy drives for Apple's Macintosh and the MS-DOS compatible Hewlett Packard HP-150. The company recently licensed Apple's hard disk technology as well. Furthermore, audio writers on a recent trade junket to Sony in Japan witnessed demonstrations of so-called "CD ROM" by the CD Project Group, with the CDP-101 interfaced with the company's own brand computer.)

An IBM spokesman would not comment on future product announcements and said that IBM makes "no product using optical storage technology."

However, IBM was one of the first licensees of a "writeable" optical disk technology devised by Energy Conversion Devices (ECD) of Troy, Michigan, in the early 1970s. ECD's patent was the basis of an "erasable" optical memory disk system introduced last year by Matsushita Electric Industrial Co.

Nor is IBM alone in its apparent move toward optical storage. Digital Research Inc. (DRI) president Gary Kildall announced his firm's involvement in optical disk software development at the West Coast Computer Faire last month.

The product he was alluding to was the Videodisc Interface Manager (VIM), a set of software drivers that, when added to an operating system disk, will allow any micro to interface with any optical disk player. Existing products are all machine specific.

"We are talking a very broad stroke approach," explains DRI's senior director of marketing Fred Cutler, "a very generic approach to the software interface. We see the videodisk as another computer peripheral. Future operating systems are likely to include the necessary drivers as part of the package." He added that the DRI software interface could function with CD as well as optical videodisk players.

DRI will be making its software drivers, along with the necessary hardware, available to retailers in July at about $50. The software drivers are expected to be sold on an OEM basis by the end of 1984. ■

Practicorp Aims New Software at Mass Market

BY KAREN COOK

NEW YORK—The former stereo industry executives who run Practicorp International, Inc. sound as if they've learned a lesson from the Japanese invasion of the hi-fi market: When you're selling consumer convenience products, remember that packaging, distribution, and price mean much more than technical innovation does.

In a splashy New York debut, Practicorp introduced three new multifunction software packages: *PractiWord*, *PractiBase*, and *PractiCalc III*—with advanced commands and functions that emulate the ones in *WordStar*, *dBASE II*, and Lotus' *1-2-3*, respectively. The Practi-family programs, supposedly easy to use and packed with "context-sensitive" help screens, will cost $99.95 apiece, or $250 for all three.

"We want to be a Lotus Development Corp. for the mass market," said Robert Shapiro, president of the Newton Upper Falls, Massachusetts company. He compared software to another high-tech product that turned into a commonplace tool for the masses—the calculator.

"Lotus is going after real professionals, people in the $250 calculator market. We're going after the $50 calculator market—people who need sophisticated programs, but want to learn as little as possible about computers," Shapiro explained.

All the Practicorp executives have backgrounds in audio—an industry that was revolutionized in the 1970s by high-quality, low-cost, heavily marketed Japanese imports. Shapiro and Colin Abernathy, executive vice president for international sales, both most recently from Micro Software International, are alumni of a British hi-fi company; Sandow Ruby, director of research and development, founded and still chairs the Tech Hi-Fi chain of stereo outlets.

Practicorp will spend more than a million dollars to advertise the new software by the end of the year, Shapiro said. Programs will be sold in bookstores and chain outlets such as Toys R Us in addition to computer stores, Shapiro said. Practicorp packaging will allow customers to browse through the documentation before purchasing the programs.

Practicorp was formed by the merger of Micro Software International (MSI) and Computer Software Associates (CSA). Ruby, who also founded CSA and is now Practicorp director of research and development, wrote *PractiCalc*, the new company's namesake and a best-selling home accountant program originally distributed by MSI for the Commodore 64.

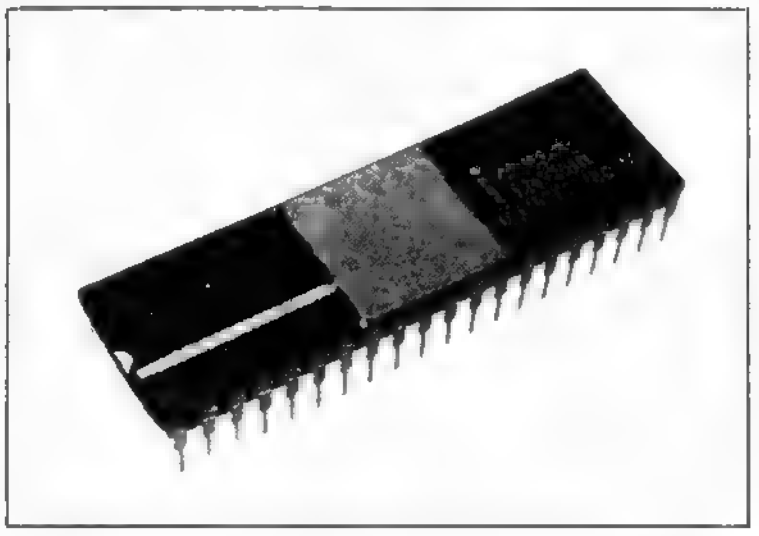
Practicorp's productivity software will be available for the IBM PC in July. ■

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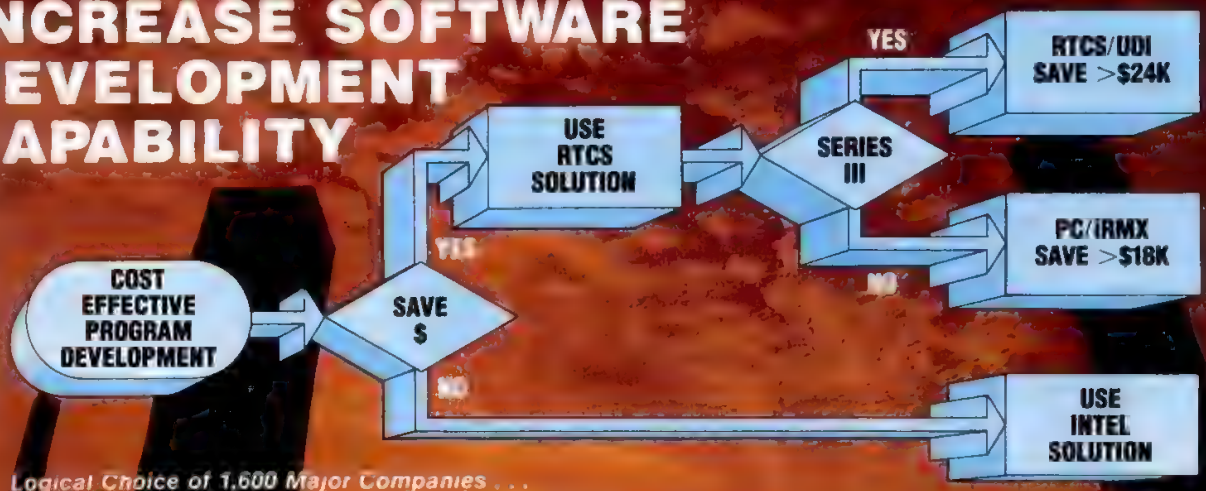
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Time Is Right for PC Fix-it, Service Vendors Say

Fixing microcomputers is not something top management can do by themselves, maintenance companies argue

BY KAREN COOK

NEW YORK—"Everyone is looking for the gold. First it was microcomputer hardware, then software—and now it's service," says Earle Humphreys, president of Computer Doctor, a New York repair store.

Nuggets of service gold lie in brand new microcomputers humming away across America, and in millions of users who still think that their machines are virtually failure-free. Microcomputer maintenance outfits are eagerly awaiting the day when those computers get old and tired—and begin to be as troublesome as an aging family car. "*They are going to fail,*" ominously predicts Darryl Olson, marketing manager for Control Data Corporation's new PC maintenance service.

Personal computer repair is already a $951 million a year industry, according to International Data Corporation (IDC) surveys, but that's small potatoes compared to the $2.5 billion the Boston-based research firm predicts for 1988. Other experts are even more optimistic, predicting that the computer-fixing industry may gross $5 to $8 billion annually within 5 years before facing the inevitable shakeout.

Third-Party Favorites

The bulk of the lucrative microcomputer service market—as much as 75 percent, some say—will go to third-party service organizations repairing a wide range of equipment. For home buyers, most third-party service will be supplied through dealers or through local "mom-and-pop" stores. Large corporations, however, will deal with many of the same companies that service their mainframes.

In the mainframe world, most big manufacturers—like Control Data Corporation (CDC), Management Assistance Inc. (MAI), and IBM—also service the big systems they make. But in the microcomputer world, especially with the growth of networking, many systems consist of equipment made by a variety of manufacturers. Even the few microcomputer companies with the resources to provide service networks are handling only one part of a complicated system. The prime example is IBM, which will service your PC, but not the Okidata printer or the Quadram board you've added on.

Probably the best-known third-party service company is MAI/Sorbus (see "On the Road with a Traveling Computer Repairperson" and "Where Do You Go When the Lights Don't Glow?" in *PC*, Volume 2 Number 5). Sorbus has 165 repair sites and 1,400 employees nationwide, repairing systems of all sizes. TRW, probably the second largest, services micros through dealers and direct corporate sales. General Electric announced plans for a major micro service network but has yet to make its presence felt, according to Ron Shugan at IDC. Xerox bought up all the extra stock from bankrupt Osborne Computer earlier this year and is busily promoting Americare, the service package it sells through computer dealers.

All of these companies handle IBM PCs as a matter of course, then pick and choose among the others. "IBM has the largest market share; IBM service is the biggest pie that can be cut up so that everyone still gets a reasonable piece," says Shugan.

Eventually, more people may consider the availability of service before they buy computers, just as they do when they buy automobiles, and that may help force lesser-known compatible makers out into the cold.

Back-Up Service

Control Data services a wide variety of peripherals with its Back-Up scheme, for example, but stocks only IBM PC and PC-XT computers. In 14 large cities to start, Control Data promises to replace faulty units and restore computer service within 4 hours. In more remote locations, for lower fees, Control Data will send exchange parts by Purolator Courier or regular mail.

CDC's Back-up is aimed mainly at the big corporate market, where Control Data has been servicing various mainframes for 14 years. Like other repair companies, CDC is hoping for an easy sell to DP managers who are accustomed to signing service contracts for their large mainframe systems. Still, "Microcomputers for some reason have top management thinking they can repair micros themselves," Olson reports. "As a result, they've got highly paid people functioning as service people. That may not be a problem now, but it will be when the micros start breaking down."

The price for a service contract with Control Data varies according to the configuration of the system used and the type of service selected. For a 256K PC with two disk drives, an IBM printer, monochrome display, and a Hayes modem, Control Data will charge a fixed annual fee of $540 for its 4-hour service. After a telephone diagnosis of the computer's ills, Control Data sends out a truck with an as-new exchange part for the broken component. Users never see the broken part again—it is shipped off to the Control Data repair center. No matter what part of the system breaks or how often, the user pays only $540.

People who don't believe that their systems will break often enough to justify the standard contract rate can opt for a flexible fee—for this system, a $204 base price, plus an extra charge every time a part is exchanged. A new IBM printer, for example, would cost $319. For flexible-fee customers who guess wrong and whose equipment keeps breaking, Control Data has a maximum charge: flexible charges will go no higher than 25 percent more than the fixed fee charge for a given configuration.

Control Data hopes that telephone consultations and parts exchange, rather than on-site repair, will keep its own and the consumer's microcomputer repair costs down to an affordable level. When users sign contracts with computer stores, the general industry rule is that repair contracts should cost about 12 percent of the computer purchase price, IDC says. When repairs are done on-site, that figure is closer to 20 percent. However, Olson says that only time and experience will tell how often micros will break and exactly how much it will cost to repair them.

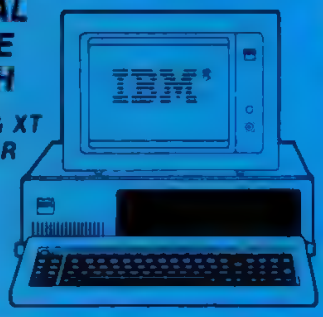
Companies that sell service contracts on good computers usually stand to do well at the outset, comments Shugan of IDC. "When you buy a brand new car you don't expect it to have any problems, and in most cases you don't. A maintenance contract sold in the first 2 years of a unit's life is generally a nice piece of revenue for the maintainer," says Shugan. "After 2 or 3 years, when the disks start to show wear and the belts that drive the machine begin to break, you start to realize the maintenance potential." ■

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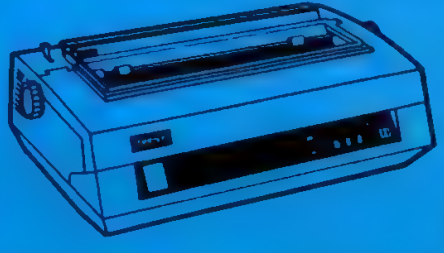
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Not Everyone Loves a Winner

You can't be as big as IBM without making a few enemies along the way. We've heard from a few groups that have vented vitriol upon the PC, its processor, and its silent spokesperson.

It's usually left wing groups that criticize large corporations, so we were surprised to see IBM attacked from the right. American Square Computers, of Jamestown, North Carolina, sent out a flyer that reached us:

"Isn't it a shame that they choose Charlie Chaplin as their symbol, Charlie who was barred from this country for his pro-Communist activities?... When the Communist-trained and financed terrorists murdered over 200 of our Marines in the Beirut, Lebanon barracks bombing, IBM should have stopped their glorification of Communist Charlie Chaplin, but no, they go right on. Does IBM care how many American boys are killed by the Communists while their Communist 'funny man?' keeps their cash registers ringing? Shame!"

Are Apple computers more politically correct than PCs? Not according to American Square Computers. "Apple is a member of the 'Resist the Draft' gang.... Shame on them!

"Because this is a free country we put up with BLOODY-MONEYBAGS IBM and the ROTTEN APPLES, but we don't have to buy anything from these SCOUNDRELS!"

(We shudder at what conclusions American Square Computers would reach if they knew that France's communist party is known as the PC.)

What's a patriotic programmer to do? Buy a 100-percent-American micro, of course—like a Morrow. And American Square Computer is ready for you to put your money where its mouth is—it's actually a store that sells Morrow machines.

IBM, Go Home

Another diatribe came from the Anti IBM Underground Guerrilla Organization, AIBMUGO—pronounced "I-B-M-you-go." This group styles itself as a techie's liberation front, urging members to "push back the IBM barbarian hordes." How? "Contaminate their data base, violate their protocol, decode their EBCDIC, punch their cards, fold, spindle, staple, and mutilate."

IBM is guilty, says AIBMUGO, of crimes against the state of the art. "IBM would dearly like to retard the technological growth of microcomputers.... IBM knows that networked, true 16-bit 68000 microcomputers will eventually cut into IBM's market for obsolete mainframes.... IBM therefore deliberately decided to put the slow and memory-limited 8-bit 8088 or 80188 in the PC and the PCjr."

AIBMUGO urged members, even before the Macintosh appeared, to buy computers based on the Motorola 68000 family of processors. "Networked 68000s are cannons aimed at IBM's mainframe dogs."

If you can't afford a 68000 machine, you can take a stand by displaying your anti-IBM lapel pin and bumper sticker, available by sending $5 to AIBMUGO, 19 Fourth Court, Hermosa Beach, CA 90254.

—James Langdell

Pirates on Campus

College programs with PCs have same software copyright dilemma as business

BY EDWARD JOYCE

NEW YORK—PCs are both a plus and a minus in the classroom when it comes to controlling copyrighted software.

"It's basically an insolvable problem," said Aaron Konstam, computer science professor at Trinity University in San Antonio, Texas. "We strive to prevent unauthorized copying, but eventually you have to depend on the goodwill of the students."

Trinity's involvement with personal computers started in the 1970s with the first kit microprocessor systems. Today, computing instruction centers around a lab equipped with 30 PCs on a Corvus Omninet and stocked with software.

There's no simple answer to unauthorized duplication. Most colleges have resorted to a library checkout type system to control software. At Trinity, for example, students check out Lotus *1-2-3* at the computer lab by signing their name on a register and leaving an ID card with the lab supervisor. Other system software resides on a central hard disk accessible to each PC over the network. A placard in the lab stipulates that the software may not be copied.

Columbia's Policy

Columbia University School of Business in New York follows a similar procedure. "Our 45 PCs are used by as many as 1,500 students a semester," says John Stephan, computer coordinator. "The student presents an ID card and we hand over a diskette containing *1-2-3*, *VisiCalc* or *Perfect Writer*. Some students have asked to use the software offsite on their office or home computers, but we don't allow that."

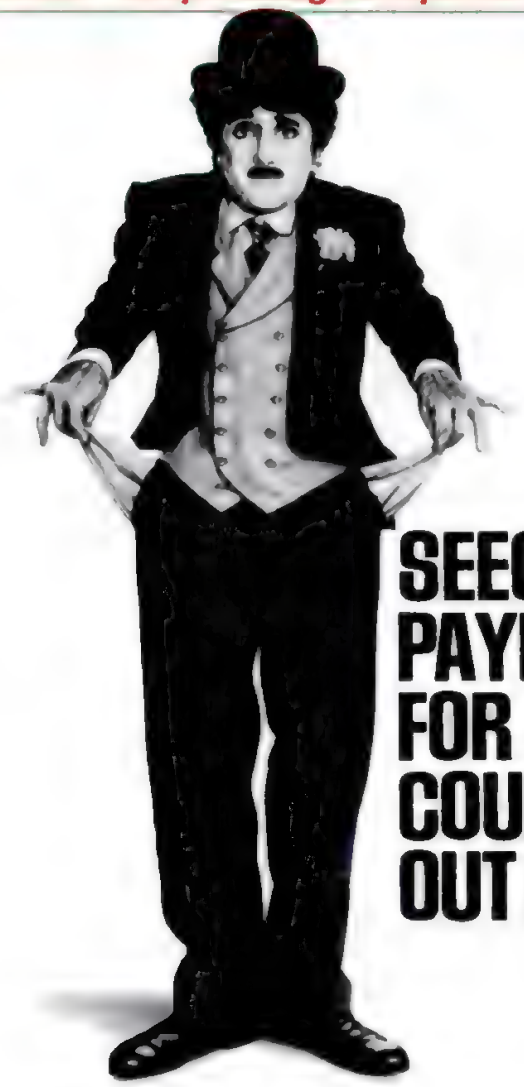
Although system diskettes may not leave the area, "students do carry data diskettes in and out of the lab," Stephan points out. Whether these disks contain unauthorized copies of software is "impossible to monitor."

Many packages, such as *1-2-3*, are inherently protected against copying. But "there's always someone who has an unlock program," says Jack Holt, associate professor at the University of Virginia's McIntire School of Commerce.

Holt teaches management information systems in a classroom equipped with 25 PCs. Again, students check into the computer lab by presenting an ID card.

Does this system prevent pirating? "Those few 'rotten apples' who steal library books will also steal software," Holt admits. "On the other hand, most of our students go to work for accounting firms or businesses that already own software. There's little motivation to remove it from the university." ■

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CIRCLE 206 ON READER SERVICE CARD

PRODUCT REVIEW

Zenith's Compatible Z-150 Packs Plenty in Its Box

The new Zenith PC drops the S-100 bus but adds greater IBM compatibility

GLENVIEW, Ill.—Zenith Data Systems, which has had an on-again, off-again presence in the microcomputer industry, is on—again—with its latest PC-compatible models, the Z-150 and the Z-160 portable.

A first look at the desktop Z-150 gives it high marks on several compatibility tests.

For instance, the Z-150 ran Lotus *1-2-3* under PC-DOS 2.1 and Microsoft *Flight Simulator* under PC-DOS 1.1 with no limitations.

Although the Zenith Z-150 cabinet sits slightly taller than the IBM PC, it is only 16 inches wide compared to the PC's 19½ inches. The new Zenith's keyboard resembles the IBM PC keyboard, but the Caps Lock and Num Lock keys contain light-emitting diodes to show their status. The Return, Shift, Ctrl, and other keys are larger than those on a standard PC, and other keys have been relocated.

Zenith Data Systems (a subsidiary of Zenith Radio Corp., which also owns Heath Corp.) is shipping the Z-150 now, but the Z-160 portable will not be available in quantity until late spring. The disk drives in the portable are in a unique pop-up lid that rises from in back of the main panel when the system is in use. The internal display has a 9-inch amber screen.

The interior layouts of the portable and desktop system are very similar, and the electronics are nearly identical. The main computer circuits for the Zenith systems are on four modular circuit cards inserted into an expanded system bus. This makes for easy maintenance and allows boards to be swapped for trouble shooting between desktop and/or portable units. (This modular approach should also make it easier to respond to upgrades in other portions of the system as they occur.)

Plenty of Ports

Both the portable and desktop Zenith machines come with two RS-232C serial ports and a parallel printer port. Color graphics and connections for RGB and composite video monitors are standard on both systems. Up to 320K of RAM can be installed on the main memory board. None of the standard video or communications ports use an expansion slot, so these machines have a lot of expansion capability. Even the Z-160 portable with two serial ports, a parallel printer port, and 320K of RAM has four full-length PC expansion slots open.

The Zenith Z-150 system with two floppy disks is priced at $3,099. The 10 megabyte hard-disk version has a suggested retail price of $4,799. The Z-160 portable carries a price of $3,199 for a two drive unit. This price is higher than the IBM PC portable, but the Z-160 comes with communications ports and expansion capability the IBM machine does not have.

Following the Z-100

By way of history, Zenith has successfully marketed its older line of Z-100 computers to federal and state government agencies and educational institutions. Released shortly after the IBM PC, the Z-100 contains both Z-80 and 8088 processors and can read and write files from IBM PC formatted diskettes. However, the Z-100 provides five S-100 bus slots for expansion cards and uses a unique method of generating graphic displays.

Zenith Data Systems is located at 100 Milwaukee Avenue, Glenview, Illinois 60025, (312) 391-8744. ■



Zenith Data System's Z-150 is a desktop-size PC compatible computer with an optional hard disk, plenty of ports, and lots of slots to spare

Windows on the World



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PRODUCT REVIEW

A Classy Chassis

Sigma Designs, Inc., is offering a classy add-on for the PC owner with card cage overload: a first-rate expansion chassis

BY GLENN HART

Expansion Chassis
Sigma Designs, Inc.
2990 Scott Blvd.
Santa Clara, CA 95050
(408) 496-0536
List Price: $895

Critics of the IBM PC have consistently complained about its limited number of expansion slots. Even the basic configuration uses at least two of the available five for the floppy disk controller and either a monochrome or color video adapter board. If both mono and color or any input/output options beyond the single parallel port on the mono video adapter are needed, the card cage is more or less full—at least if standard IBM boards are used.

This situation has not gone unnoticed or unremedied. Third-party board manufacturers have crammed more and more functions on an incredible variety of multifunction boards. Everex Systems, Inc., of California has even announced a new board with both mono and color video, two serial and one parallel ports, 384K of RAM, and a battery-backed clock calendar.

The multifunction boards deserve the success they have achieved. They are less expensive than separate boards and certainly take up fewer of the precious slots. However, there can be problems. Some of the boards have such dense layouts that they run rather hot. There can also be conflicts of various sorts. For example, if two boards both have clock chips that are addressed in the same place, serious difficulties may arise. Also, not all the boards are totally compatible with standard IBM boards or each other. Fundamentally: what happens if you need only certain functions on a given board, or the board offers more performance or special features, but no slot is available? Suppose you want to use a mouse that needs an internal interface board, an internal modem board, an 8-inch disk controller, A/D or D/A boards, or any of the tremendous diversity of cards that can be used in a PC. What do you do?

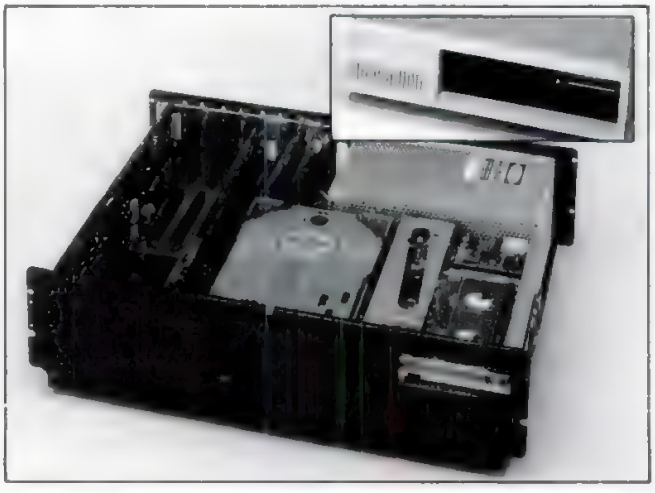
Compatable Chassis

The answer for those with such advanced needs is an expansion chassis, a box with its own motherboard and card cage to accommodate more expansion cards and a power supply to power them. Optionally, the expansion chassis may be able to house one or two hard disks of various types to add storage capacity to the system.

IBM itself offers an expansion chassis, but only a model with a 10-megabyte Winchester hard disk. Outside vendors have undercut IBM hard-disk's price-to - performance - and - storage ratio.

Another unit offered by I-Bus Systems of San Diego is a "pure" expansion chassis in that it is designed *only* for extra cards, with no provision for a hard disk. Unfortunately, the I-Bus has only six slots itself. All expansion chassis work by interconnecting the expansion unit to the main system unit with a shielded cable and interface card, which itself takes up a slot in both the system unit and the expansion chassis. Thus the I-Bus system offers a total of only nine slots actually available for cards. Cleveland-based Tecmar also offers an expansion chassis with a similarly limited capacity combined with difficulty of installation.

A better alternative is now available from Sigma Designs, Inc., of Santa Clara, California. Its expansion chassis has 9 slots, so a total of 12 slots is available in a Sigma/IBM system after the driver card is installed in the PC and the receiver card in the Sigma. The slots are arranged in alternating 0.8- and 1.0-inch spacing, so either old- or new-style cards can be installed. Two of the slots can hold only short cards (like the IBM XT's), but the short receiver card is a natural resident of one of the short slots. The chassis has room for two full-size 5¼-inch hard disks, though I acquired a version without the hard-disk option. The Sigma hard-disk system will boot DOS directly from the hard disk, a feat that has so far eluded several other suppliers. It also has a heavy-duty power supply (rated at 135 watts) that can handle two hard disks and a full complement of expansion cards.



A Family Resemblance

The Sigma resembles a normal PC, but, under close observation, the finish is an imperfect match. Inside, the layout is much the same, with cards to the rear left, the hard disks side-by-side in the right front, and the power supply at the rear right.

A small, interface driver card is inserted into a slot in the PC. The Sigma features DMA (direct memory access) even from cards located in the expansion chassis (unlike many competitive units). The one dip switch on the interface card, which must be set to indicate the lowest address of any RAM or ROM memory to be located in the expansion chassis, is superfluous if the chassis contains no memory or video boards. A 4-inch-wide shielded ribbon cable connects the interface card to the small receiver card in the expansion chassis itself. This is the full extent of the installation.

Good Performance

While I certainly didn't try every permutation, I did test nearly every card in the Sigma. Basically, most cards were equally happy in either the IBM system unit or the Sigma expansion chassis (the IBM floppy controller could not be moved because of its short connection cables to the floppy drives). The only problems were with my system's Tallgrass hard-disk interface and an experimental video board, both of which only worked correctly in the PC itself. The Tallgrass uses DMA for its transfers, and perhaps there was some timing problem or DMA conflict; the video board, however, uses a wait state. The Sigma motherboard does not implement a wait state, so the rare board that requires one will only work in the system unit. This is extremely impressive compatibility.

At $895, the Sigma is reasonably priced (their hard-disk prices are *very* reasonable). The price seems especially fair, given the construction, heavy-duty power supply, and superior performance. ■

What's in a Name?

If you've been tracking the genesis of *Framework*, Ashton-Tate's new integrated software package, you probably know that its code name during development was "FRED." When we spoke with Rob Carr, the designer of *Framework*, we asked him where the name had originated. He said that it was an acronym for "FRame EDitor," owing to the system's frame or window orientation. He liked the name well enough that it stuck as the name of *Framework*'s internal procedural language.

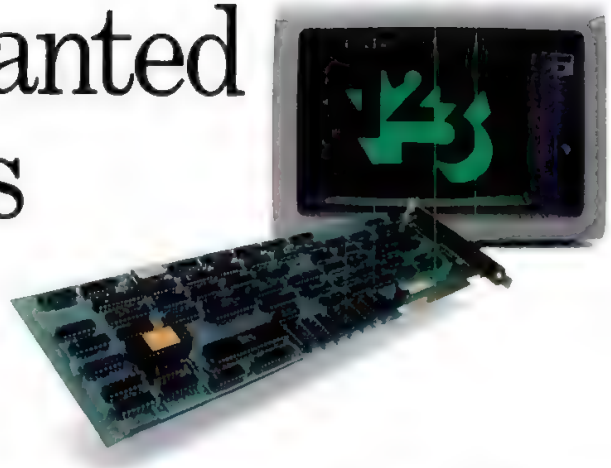
When we saw the *Framework* demo in the Corona booth at Winter COMDEX, the person doing the demos was explaining that FRED stood for "Freely extensible REcursive Development" language.

Somehow, we liked the old version better. ***—Bill Machrone***

Calendar of Events

DATE	EVENT	COMMENT	LOCATION	CONTACT
June 15-17	Computerfest '84	Exhibits, seminars, and hardware trading.	Dayton Convention Center Dayton, OH	Mid West Affiliation of Computer Clubs P.O. Box 24505 Dayton, OH 45424
June 20-22	UNIX-Concepts Functions/Applications	Seminars introducing UNIX and C.	Hyatt Palo Alto Palo Alto, CA	The American Institute For Professional Education Carnegie Bldg., 100 Kings Rd. Madison, NJ 07940 (201) 377-7400
June 20-22	Project Planning, Scheduling & Control Using PCs	Workshops to upgrade productivity with PCs.	AMA Management Center Washington, DC	American Management Association P.O. Box 319 Saranac Lake, NY 12983 (518) 891-0065
June 21-24	Boston Computer Showcase Expo	Hardware and software.	Hynes Auditorium Boston, MA	The Interface Group 300 First Ave. Needham, MA 02194 (800) 325-3300 (617) 449-6000
June 25-27	Personal Computers & Networking	Seminars on using, selecting PCs.	Detroit-Plymouth Hilton Inn Plymouth, MI	Center For Advanced Professional Education 1820 E. Garry St. Suite 110 Santa Ana, CA 92705 (714) 261-0240
June 26-28	PC Expo	IBM PC and compatible trade show.	New York Coliseum New York, NY	PC Expo 333 Sylvan Ave. Englewood Cliffs, NJ 07632
June 28-July 1	Milwaukee Computer Showcase Expo	Hardware and software.	MECCA Milwaukee, WI	The Interface Group See above
July 9-12	1984 National Computer Conference	Hardware, software, seminars.	Las Vegas Convention Center Las Vegas, NV	AFIPS, Inc. 1899 Preston White Dr. Reston, VA 22091 (703) 620-8940
July 11-12	Personal Computer Local Network Seminar	Seminars on the the PC local network market.	Hyatt Regency San Francisco, CA	Architecture Technology Corp. P.O. Box 24344 Minneapolis, MN 55424 (612) 935-2035
July 16-17	Computer Security Workshop	Workshop on security needs and concerns of IBM, compatible users.	Marriott Crystal Gateway Arlington, VA	Computer Security Institute Dept. IP, 43 Boston Post Rd. Northborough, MA 01532 (617) 845-5050

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Future Computing Sees XXT Lap Portable in IBM's Future

At Technology Seminar, industry researchers look into fuzzy crystal ball of IBM PC compatibles.

BY RON WHITE

RICHARDSON, Texas—A briefcase-size, battery-operated computer from IBM Corp. by 1985 is a good bet, according to one of the best IBM and PC industry researchers, Future Computing Inc. This is just prediction—about an often inscrutable company and an exciting product line—presented by the Dallas area research group at a recent Technology Day seminar.

Future Computing claims no inside information as to what's going on in the IBM labs. Based on trends in technology and the marketplace, the firm sees the following developments:

- IBM's introduction of a briefcase-size, battery-operated computer probably by 1985;
- An advanced version of the PC-XT, incorporating graphics and sound capabilities similar to those in the PC*jr*, and a true 16-bit bus;
- IBM personal computers based on more advanced microprocessors, creating more powerful machines at the expense of compatibility with the PC;
- IBM-compatibles and independent software vendors gaining ground in their share of the IBM-dominated market.
- Egil Juliussen, Future Computing's chairman, emphasized that current technology does not lend itself tc producing a briefcase portable that matches Future Computing's definition for the highest standard of compatibility with the PC—even if the lap-size computer is created by IBM. "Operationally compatible," according to the researchers' definition, means a computer can run off-the-shelf software written for the IBM on 5¼-inch floppies.

"The power requirements to run a floppy disk drive are so large that the only battery that can handle it is the one in your car," Juliussen said. Another constraint on compatible, lap-size computers is liquid crystal displays, which are slow and have only one intensity, he added.

Declining Compatibility

Still, Juliussen sees IBM introducing a briefcase-size portable by 1985, and he predicts that the new machine, along with a "book-size" computer he did not elaborate on, will account for 8 percent of IBM's personal computer revenues by the end of the decade. But, the ultra-small computers will probably be less than 100 percent compatible with the PC.

In the meantime, a high-end version of the XT is expected, possibly later this year, according to Future Computing's staff. They dub it "XXT." The XXT would have two buses, one external that would match the current 8-bit bus of the PC to ensure compatibility, and an internal 16-bit bus that would take advantage of the full data path capabilities of the PC's Intel 8086 microprocessor. The super-XT would have better support for hard disks—up to 70–100 megabytes—and include a superset of PC color graphics and sound generation, two areas in which the PC*jr* is a more versatile performer than its big brother. Standard features on the XXT would include a color graphics adapter, printer interface, serial port, and a calendar/clock. Expansion memory, hard disk and streamer interfaces, and support for local area networks would be available as add-on boards.

Future Computing's staff only speculated that IBM may go further in the development of more powerful personal computers, all based on Intel's 16-bit family of microprocessors.

New Chips

Intel's 80186 and 80188 microprocessors, for example, include direct memory access, counter/time functions, and some additional instructions all on the chip. John Hemphill, vice-president of Future Computing's Technology Group, said that taking advantage of the additional features of either microprocessor would require relatively minor conversions of some of the existing software for the PC, such as programs that use the computer's sound capabilities. The chips would also limit the PC's expandability, he added.

Using Intel's 80286 microprocessor would create a machine more capable of handling the windowed, integrated application programs and of supporting local area networks, two features that are attracting the attention of users, Hemphill said. But most software would require more extensive conversion to take advantage of the chip's full capabilities.

While not going so far as to forecast IBM's production of an 80286-based computer, Hemphill said its introduction would be "appropriate" in the third quarter of 1985.

The possibilities presented by Future Computing suggest IBM may be embarking on paths that lead to incompatibility with its own PC. That might be some comfort to the computer manufacturers who sent representatives to the seminar to learn about the problems of creating and selling a computer that's as compatible with the IBM PC as possible without inviting a copyright violation suit.

Refining Definitions

The number of computers in the operationally compatible category has increased from half a dozen a year ago to more than 45 machines. In fact, the number of computers that now match Future Computing's highest standard of being able to run most off-the-shelf IBM software has grown to the point that the classification is losing meaning. Future Computing is considering further refinement of its standard of compatibility.

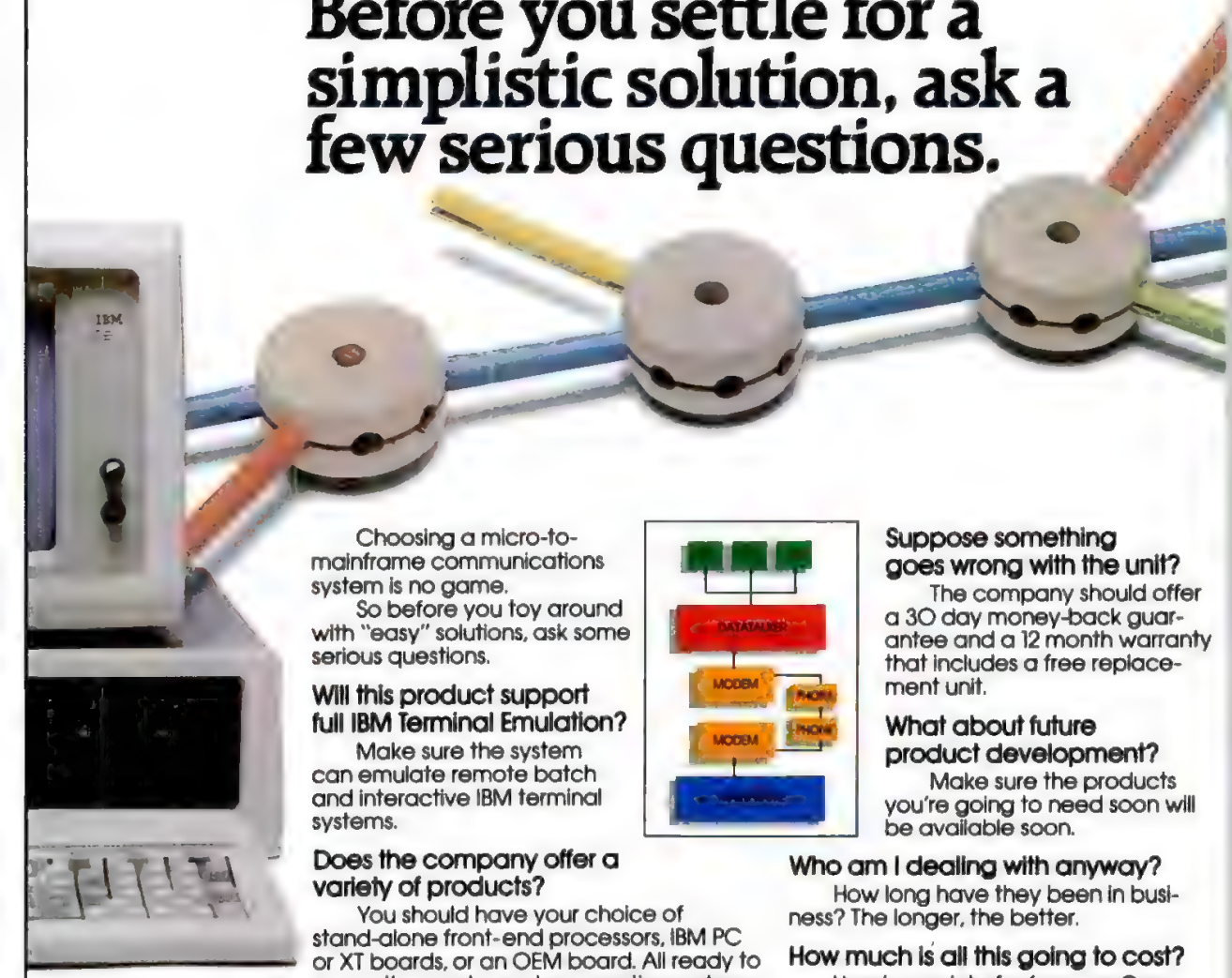
The trend is toward being as identical to the IBM as the law will allow. Ron Ward, executive vice-president, said that those companies that insist on making "improvements"—such as 3½-inch disk drives or faster microprocessors—are going to have a hard time finding market acceptance.

For compatibles in general, Future Computing's research predicts their share of 16-bit hardware sales will increase from 30 percent in 1984 to 38 percent by 1989. At the same time, IBM's share of that market will decrease from 55 percent to 42 percent. (The remainder is made up of third-party manufacturers of such hardware as add-on boards and disk drives.) During the same time, IBM's share of the software market for PCs and compatibles will decrease from 32 to 23 percent.

But the computer market will increase so dramatically during this decade that IBM won't be suffering even if its share of the market in the personal computer field decreases. Future Computing expects overall personal computer hardware sales by 1989 to increase from $4.5 billion to $17.1 billion and software sales to increase from less than $1 billion to nearly $7 billion. ■

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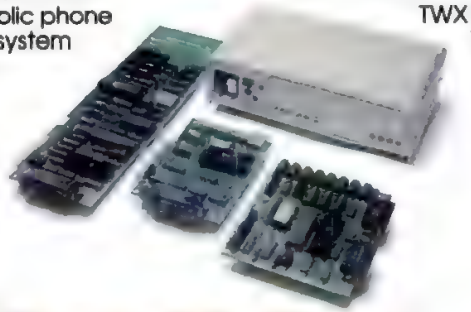
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People in the News: Farib Naib

Teaching IBM how to use PCs is quintessential assignment for generalist and recent Wharton graduate

BY CONNIE WINKLER

PHILADELPHIA—Farib Naib taught IBM about the IBM PC, and he has a plaque to prove it.

It wasn't the PC birthplace in Boca Raton that needed the expertise of the industrious and ingenious recent Wharton School graduate. It was the financial services and treasurer's office of IBM's National Marketing Division (NMD) in Atlanta, which a year ago had the same business needs for a PC as any large organization.

At the end of the fiscal quarter, IBM employees there were working into the wee hours to prepare, compile, and telecopy off to IBM headquarters their financial results. At the same time the company was going through a huge internal reorganization.

Although there were two IBM PCs in the financial services offices, there were 150 accountants—and no mainframe connections. "It was the office of the past," recalls Naib—understandable at that time because IBM was getting products to its customers first.

Summer Work

It was the summer of 1983 and Naib, who had a degree in marketing from Emory University in Atlanta, was looking for a summer job. Because of a previous IBM assignment, Naib got another "temporary" assignment to plan and implement a PC system for the NMD financial services group—including a training program.

"I had shown that I could work in the environment and work very well," Naib offers modestly about the previous IBM job.

Custom Worksheets

Using Lotus' *1-2-3*, Naib customized income statements for the IBM accountants. One accomplished in 4 hours what had previously taken 4 days. Another worksheet application was reduced from 15 hours to 15 minutes. Using *PC-Talk*, Naib designed the communications parameters to transmit this information to other PCs in IBM offices in White Plains, New York.



"I had a lot of fun," Naib recounts, although he only took four weekends off the entire summer and worked many 70-hour weeks. At the end of the summer, when he did take a Bahamas break, IBM had a helicopter retrieve him (still carrying his flippers) when a problem developed.

Looking back, Naib appreciates his special position at IBM, perhaps unique because he was a student who knew about PCs. "No one felt threatened by me," Naib explains. "I was young, from Wharton—an eccentric guy."

Naib, 24, has always been a few steps ahead. During high school he ran his own concert lighting company with a Radio Shack TRS-80, teaching himself about electronics along the way. His odd jobs included developing a microcomputer research system for an ophthalmologist.

Naib bought his first PC—a one disk drive model—as he was entering Wharton in August, 1982. That was the best buy—and he installed his own drives, which is his "do-it-yourself" way with most hardware. At that point Naib selected a PC based on his own instincts about microcomputers: "When I was at IBM the first time the feeling there was that the PC was kind of a toy."

It wasn't all serendipity that he landed the PC job at IBM, however.

Error Predictor

In 1981 IBM in Atlanta was getting too many reports of errors in programming code for its System/34 and System/38. Errors in lines of code were running 200 percent higher than predicted, the Wharton graduate recounts. "Someone at IBM had looked at the situation and said, 'Let's hire some kid to research it.'"

Enter Naib, at that time on his way to graduate school at Northwestern University.

Naib had taken several computer science courses, but what he brought to the error prediction problem came from his genetics and statistics courses. "Genetics is very step-by-step," he explains, and that's the approach he used to build an error predictor that gave 95 percent accuracy.

The original 3-month project was so successful that he stayed on for a year and a half, still as a temporary worker. He wrote two technical papers and delivered a 6-hour seminar on the topic to a large group of IBM computer scientists gathered at one of the IBM development sites.

"I was scared, I must admit," he says. As it turned out, there were no questions he couldn't answer.

Besides his genetics training, Naib brought to that problem his overall orientation to business: "I am a generalist. I'm not the most technical person with the PC."

The Wharton School places a high premium on work experience and Naib believes it's the IBM stint—especially the technical papers he wrote—that got him in.

The Wharton 2-year MBA program has been a happy time for him, although he sometimes leaves the phone off the hook because of all the PC-related calls he gets. He jokes that his Philadelphia apartment building, home to many Wharton students who have PCs, ought to have a local area network for even quicker communications.

Generally Speaking

Naib brought his generalist view to the IBM PC project, and it has landed him subsequent PC consulting jobs. The latest is a PC and TRS Model 100 system for international bankers doing options trading at Merrill-Lynch in New York. He's developed a model that calculates the value of their call options, accounting for the volatility of the currencies. "A lot of people know PCs, but not that many people can go in and build an options trading system," he explains.

He characterizes the problems he solves as simple. "People are trying to do everything at once, including learning the PC. I start simple: Get to the basics first and then move up."

Such generalist problems are perfect for the PC. "PCs are not computers for computer science people," says Naib. "They are computer power for the masses—like the calculator."

It's the generalist preference that keeps him from going to work permanently for IBM, it's not as if no one has asked! ■

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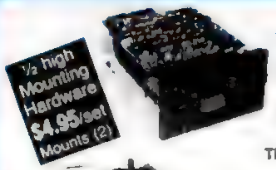
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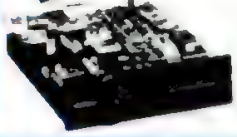
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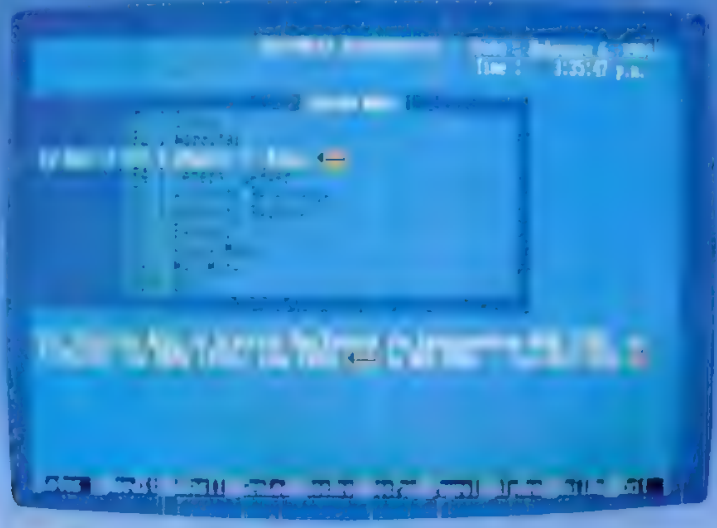
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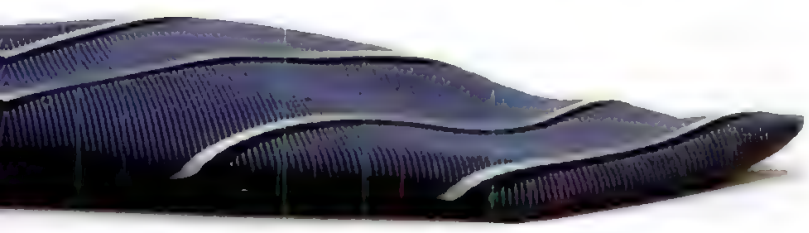
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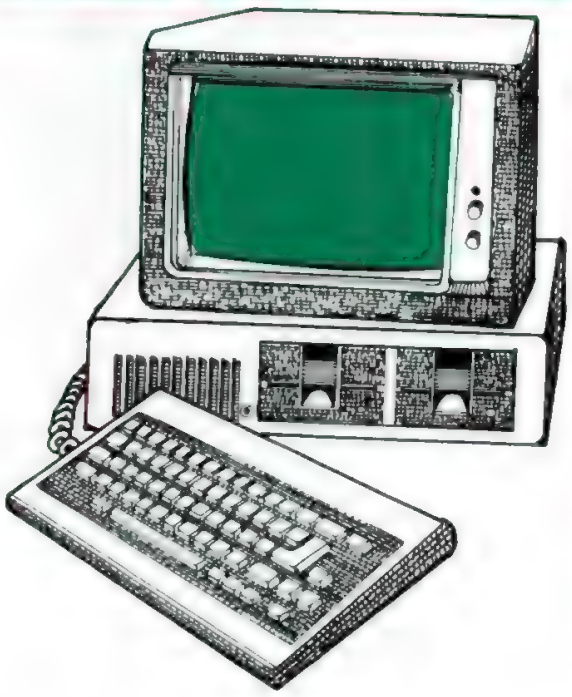
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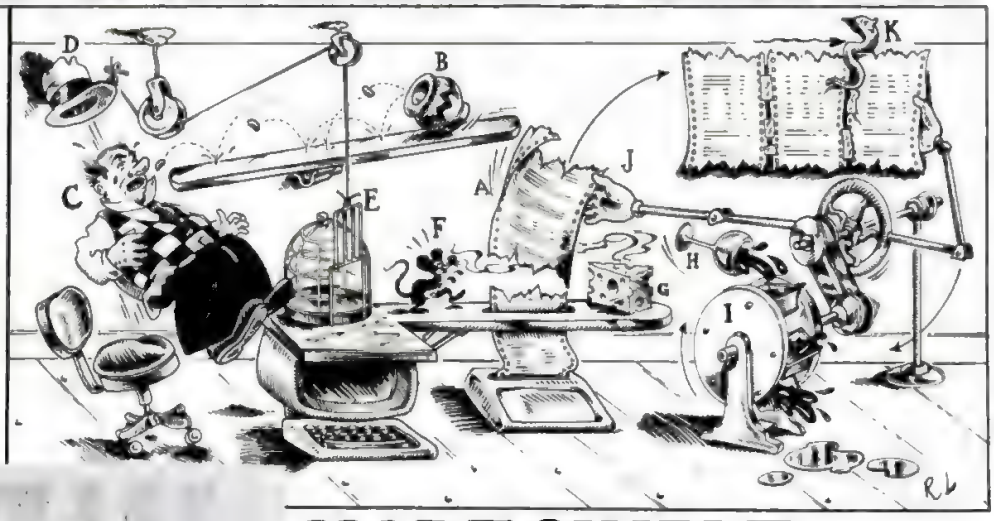
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MOUSE, INSPIRED BY SCENT OF PERFECTLY AGED CAMEMBERT CHEESE, GNAWS THROUGH SPREADSHEET, ONLY TO DISCOVER HE HAS BEEN FOOLED BY AROMA OF OVER-RIPE GORGONZOLA (G)

IN A FIT OF PIQUE HE SPILLS VINTAGE WINE (H) INTO WATER-WHEEL (I) WHICH TURNS PULLEY THAT CAUSES GLOVE (J) TO GRASP SPREADSHEET AND MOVE IT TO TAPING AREA.

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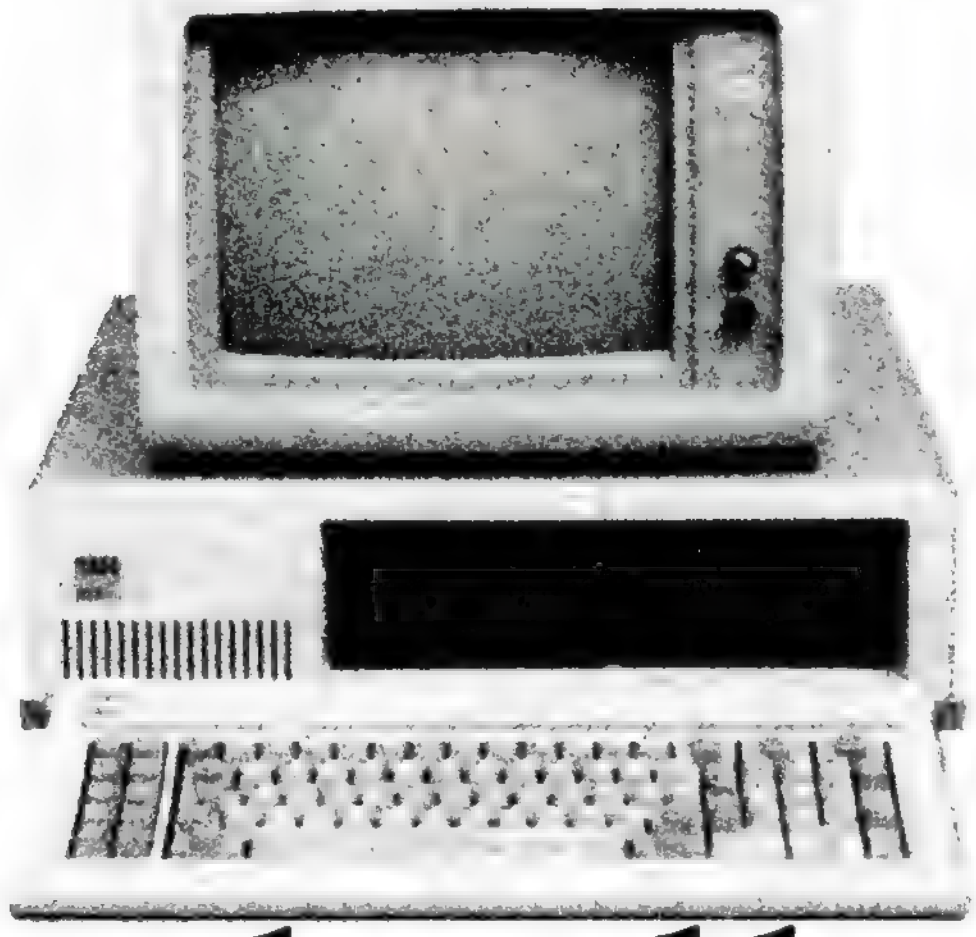
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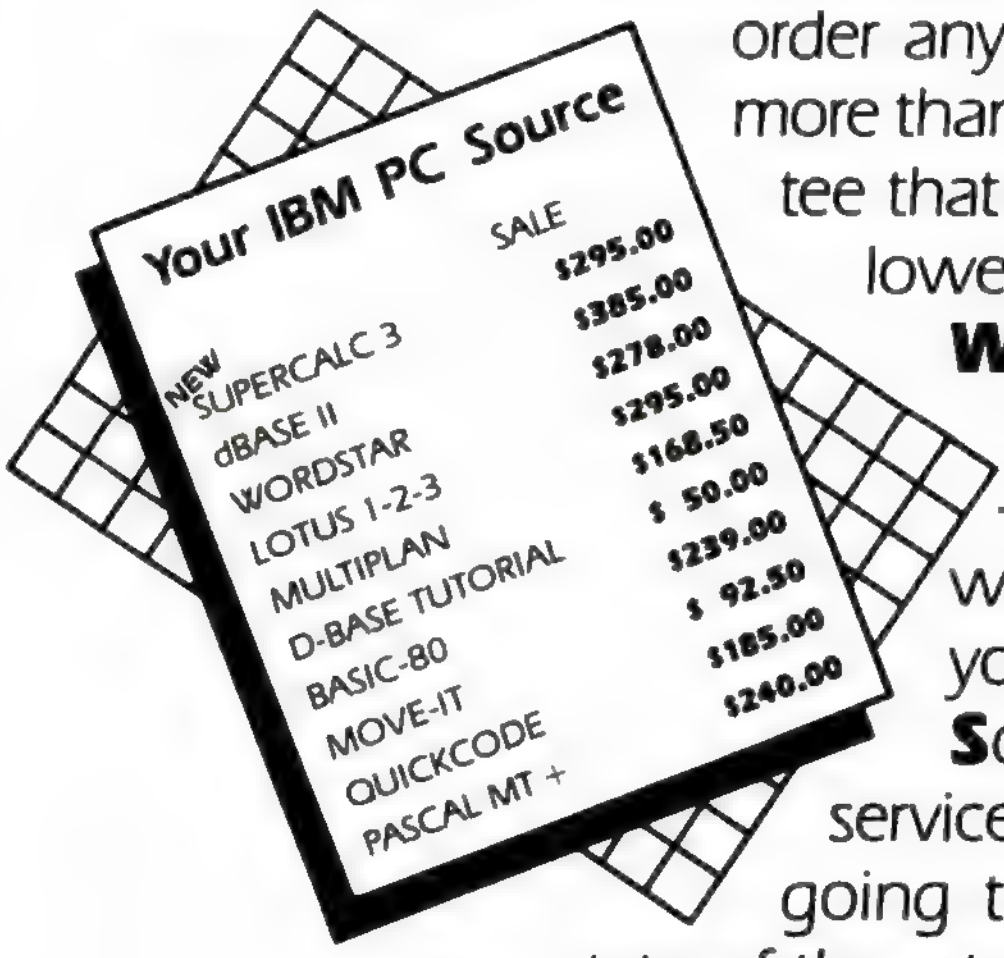
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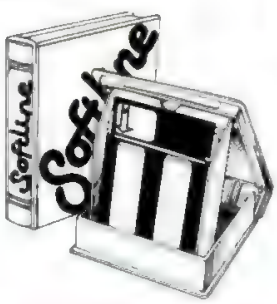
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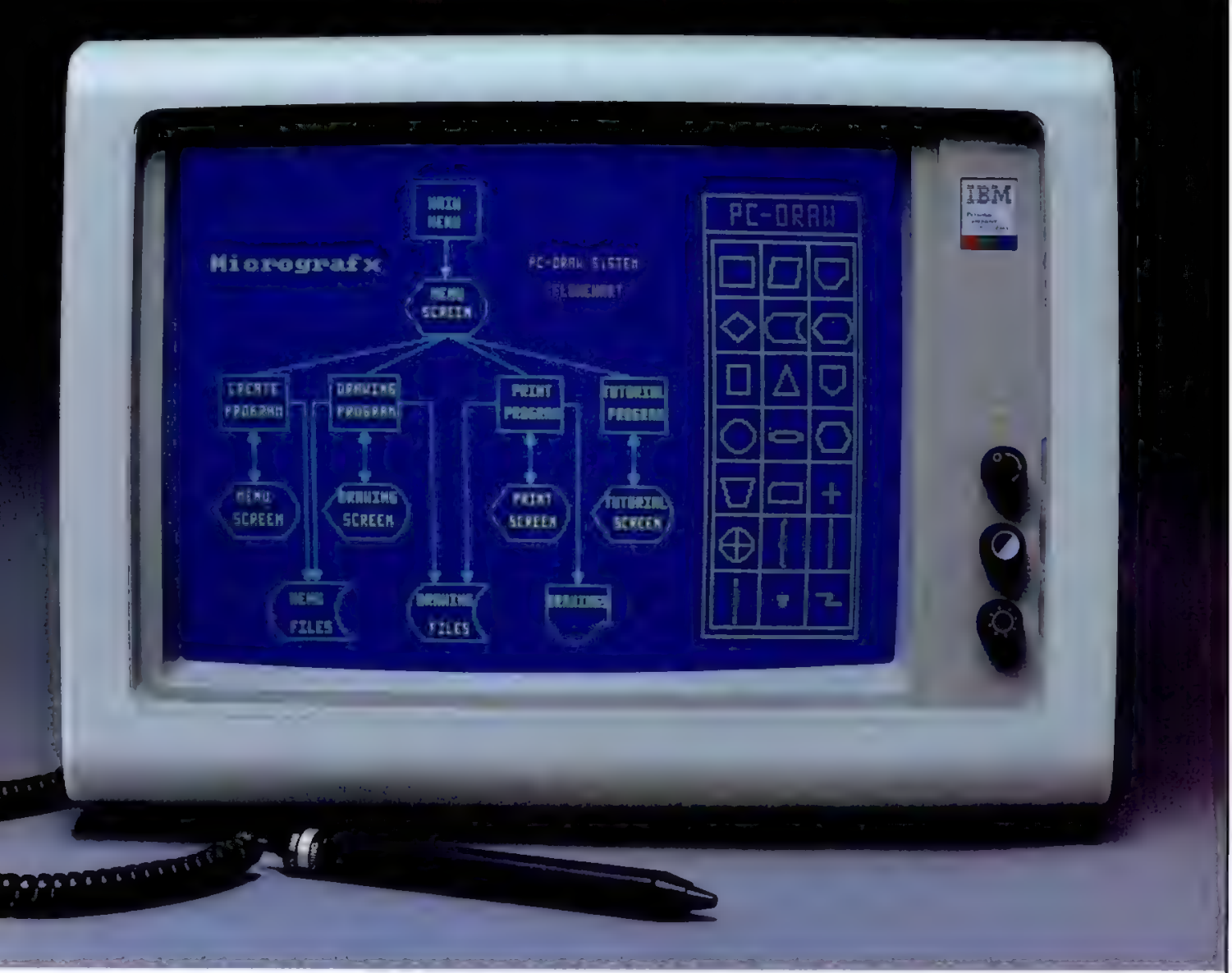
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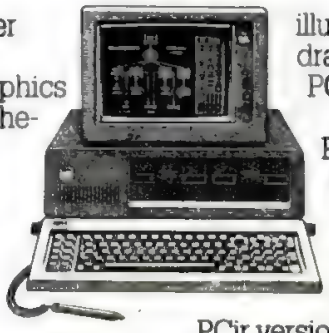
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CIRCLE 181 ON READER SERVICE CARD

Meet John Dough

Who's the most successful, influential, informed, well-off, and with-it audience for a computer magazine anywhere today? Pat yourself on the back—we're a perfect match.

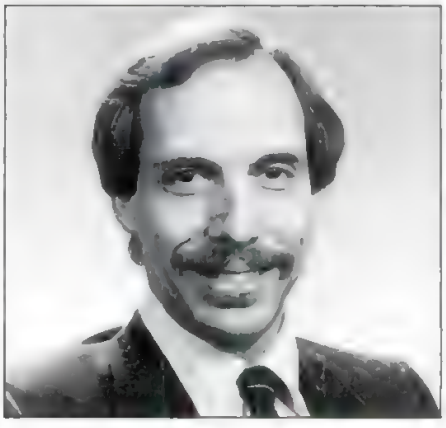
There's a running gag in *Butch Cassidy and the Sundance Kid* that's become part of the American vernacular. As Paul Newman and Robert Redford make tracks over the hardscrabble countryside, a cloud of Pinkertons follows several steps behind like a Japanese wife. Every few minutes the laconic superstars peer over their shoulders and ask with increasing urgency: "Who *are* those guys?"

We've been wondering the same thing about you. Each day we receive bags of mail chockablock with perceptive comments, erudite queries, and incisively written suggestions. Our readers really know their PCs. Who *are* you guys?

To find out, *PC* recently commissioned an *independent* study of 2,000 *PC* subscribers nationwide, and the results are awfully impressive. The typical *PC Magazine* subscriber is young (38 years old), male, well-schooled (94 percent are college-educated; over a third have post-graduate degrees), and affluent—his average household income is a whopping $65,000. With apologies to Frank Capra, Meet John Dough.

There's a Mrs. Dough in three-quarters of the households and the patter of little Doughs in half (fertile territory for the PC*jr*). The average *PC* subscriber's family is composed of two adults, one child, and slightly less than one bouncing PC.

There are few drones among you: 97 percent of all subscribers are gainfully employed. Virtually all of you spend the day toiling away at managerial or professional/technical jobs. Nearly a third of these positions are with companies involved in the sale or manufacture of microcomputer equipment or software. The companies for which subscribers work have annual sales of two-thirds of a billion bucks. This is serious business, folks.



Paul Somerson

A whopping 94 percent of all *PC Magazine* subscribers currently use microcomputers. Of these, 95 percent use their PCs for business purposes. Half use computers both at home and at work for their business. Eight out of ten own at least one (and three out of ten own two or more).

And you're seasoned professionals—the average subscriber who uses a micro has been doing so for 3 years and puts in about 16 hours each week at the keys. He also devours the magazine you're turning in your palms: the typical reader spends 3.3 hours perusing our pages, while a third stay with us for 4 or more hours. Six out of ten of you pass your copies along to other lucky readers, three on average, but ask for the magazines back; over 80 percent torture-test the structural integrity of your bookshelves by retaining all your issues for posterity—or at least future reference. Another 7 percent sunder each copy when you're done poring over it to file away items of interest. And *PC* is clearly your favorite; while you flirt with other computer publications (including our sister periodical, *PC Tech Journal*,) no other single publication in the field is read by as many as half of you.

But you're not just end users—you're influencers. Seven out of ten subscribers who use company-owned micros are involved in company computer purchasing decisions. And a total of 83 percent of you gave someone advice on the purchase of IBM or IBM-compatible personal computer equipment in the past year. Evidently, you're a persuasive group: the typical advice-giving subscriber spread the word to more than a dozen others, between six

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Introducing...SixPakPlus™, the refreshing new 384KB multifunction card! In response to the changing needs of the IBM PC and PC-XT marketplace, AST Research, Inc. is proud to announce the latest addition to our line of multi-function enhancement products, the **SixPakPlus**! This new product is the result of extensive marketing research into the needs of IBM PC users whether they have the original 64K system board, the newer 256K system board, or the PC-XT. The **SixPakPlus** has been engineered to meet these needs at a competitive price while maintaining AST's high standards for quality and reliability.

The **SixPak**, as we like to call it, could have been named for the six banks of RAM on it. However, we like to think that it was named for the six functions of the card.



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The features of the **SixPak** include:



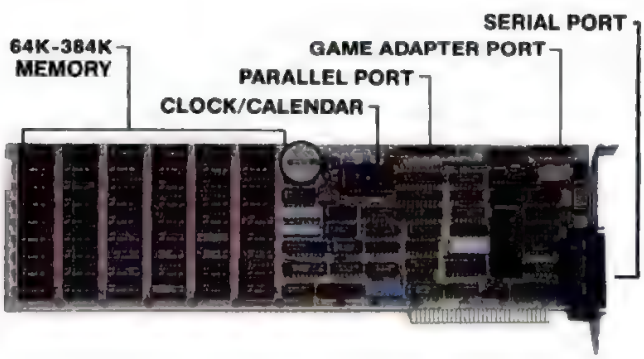
1. RAM memory starting at 64K, user-expandable in 64K increments to 384K. This makes the **SixPak** ideal for the PC or PC-XT with a 256K system board; 384K on a **SixPak** added to 256K on the system board yields 640K, the maximum addressable user memory in these systems.

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5. An optional IBM-compatible Game Adapter port, for use with an IBM-type joystick. In conjunction with application programming, this game port may be used for cursor control, in generating graphics or for playing games at the end of your work day!



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CIRCLE 101 ON READER SERVICE CARD

and nine of whom went out and bought what you suggested.

You're fairly hefty purchasers yourselves. You plunked down an average of $6,500 for your system. Seven out of ten purchased equipment in the past year, spending an average of $3,700. And 45 percent of you say it's likely that you'll buy a PC or PC compatible for your own use in the year ahead. Another half have your eyes on peripherals and software. Of those involved in company purchasing decisions, nine out of ten say their firms are planning to buy additional PCs or PC-compatibles in the next 12 months.

In the aggregate, some of the figures we uncovered are nothing short of astonishing. The total spending power of *PC*'s primary audience is a staggering $13 billion. You have more than half a million years of microcomputer experience among you, and you put in 3 million hours of computer time each week (and another 660,000 hours biweekly reading each issue). Together, all subscribers directly influenced 867,000 microcomputer purchases in the past year. And over 70,000 of you are corporate managers who will be involved in making key microcomputer purchasing decisions in the year ahead. Your investment in equipment exceeds $900 million, and you spent over half a billion bucks on equipment, supplies, and software in the past 12 months.

Seventy percent of you read the advertisements in *PC*, whether or not you have an immediate need for the product or service advertised. And you're an extremely responsive group: seven out of ten made a decision to buy a product as a result of seeing an ad in *PC*. Advertisers who track the source of their sales tell us that *PC* is as much as ten times more responsive than the competition. It figures.

Let's face it—you're a first-water audience. And we at *PC* sweat buckets to give you the finest editorial package of any computer magazine available today. We rely on an impressive stable of writers and illustrators whose pyrotechnics have garnered *PC* national attention even in the noncomputer world. We're one of the publishing industry's biggest success stories. And we owe much of this to you, for having the discriminating taste to choose and stay with us. We like to think we're the best at what we do, and the numbers show you're the best at what you do. A perfect match. ■



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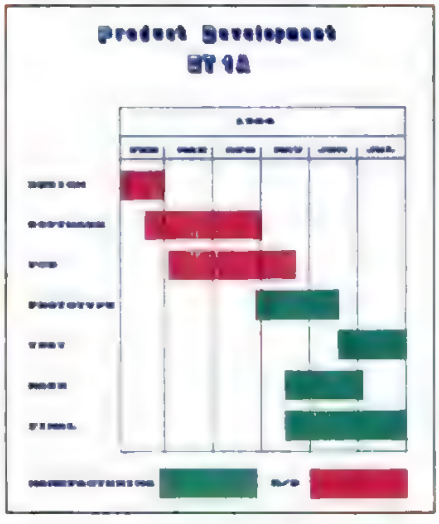
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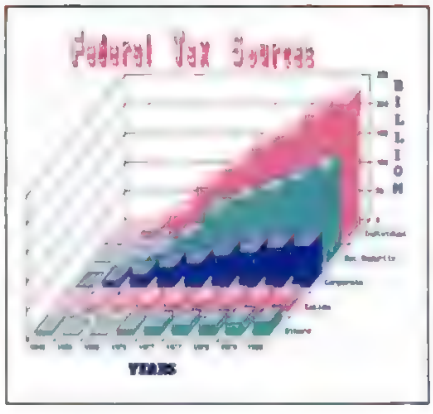
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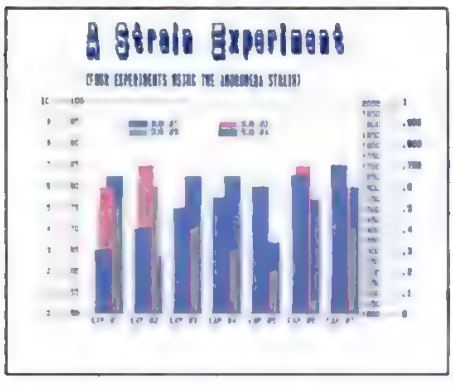
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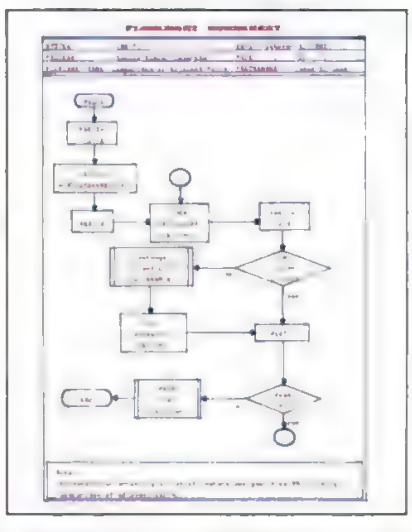
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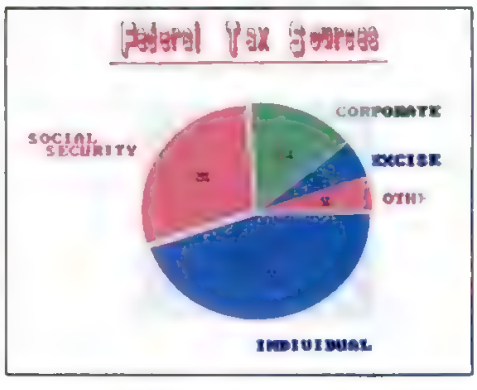
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Surviving the Coming Shakeout

Computer book publishing is facing uncertain times as the proliferation of titles outpaces the demand. Only a special breed of books is likely to survive the competition.

The top ten computer book publishers have announced plans to release 1,500 new titles during 1984, almost twice the number they published the previous year. In addition, the trade houses are said to be planning 1,500 more. Can the market absorb this title output?

We'll soon know, since this outpouring of books is beginning to appear on the market. The spring and fall seasons of this year could go down in publishing history as comprising the start of the Great R.O.I. (return on investment), or—less happily—as the signal for the Great Shakeout.

Some indications are not positive. In fact, many publishers are facing the possibility of returns of computer books in unprecedented numbers.

There will be big winners—and big losers—in computer book publishing, depending on the strategies publishers adopt in response to these market forces. I think that a winning publishing strategy should emphasize five key factors.

The first is value added. The market has no place for books that are rehashed technical manuals cluttered with incomprehensible jargon, poor writing, and mediocre graphics. Authors should enhance their subject matter with a depth and expertise unavailable elsewhere. They should be chosen for the readability of their style, and their work should be given an appealing graphic presentation if it is to succeed in today's cluttered book store environment: Both interior text and jacket design must be strong enough to capture the reader's eye and imagination.



Nahum Stiskin

The second key factor in a winning strategy is niche. The computer marketplace ranges from the low-end home sector to the high-end multi-user/multitasking networking environment. Some publishers strive to address all markets at all levels; most would probably do better focusing on limited segments of the hardware and software markets.

The third element of a winning strategy is a publisher's ability to ride the wave of the future. Good books on the forefront of technological change will have the longest shelf life; their sales will grow together with the user base of a given computer or software program. In addition, to ensure the timely release of quality books in this rapidly changing market, publishers must put to use those computer applications that improve the competitiveness of their products: computerized typesetting, digitized graphics, electronic word processing, and laser printing.

A fourth key to success in computer book publishing is an emphasis on marketing, including innovative advertising and promotional efforts carried over from traditional trade publishing practice. Well-focused, high-profile print advertising campaigns and, wherever possible, national author media tours, must be buttressed by effective in-store merchandising if a given title is to rise above the proverbial "noise" that besets the entire computer marketplace.

Finally, unlike general trade publishing where most product is sold by title, computer book sales will be influenced more and more by the credibility of the publisher's imprint. Hence, a publisher's reputation for maintaining high standards will prove indespensable to a winning strategy. In the end, it is quality that will prevail and endure. ■

Nahum Stiskin is the publisher and general manager of Microsoft Press.

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PC EXTRA
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Excitement Spreads

The Good News. R

Unlocks PC Power

When I woke up this morning, I certainly didn't expect to find a solution to the problems of managing data in our business. I knew my PC had the power, but no one had delivered the key to unlock it. But there it was, at my doorstep. Revelation by Cosmos.

Revelation is an extended implementation of the †Pick Operating System for the †IBM PC, †XT and compatibles. This powerful data management environment has been running on mainframe and minicomputers for years.

I'm no programmer, but as a businessman I can sense and respect the freedom of data organization in this system. It's simply a complete applications environment designed for non-programmers with the kind of flexibility and depth that even an experienced programmer can appreciate.

Easiest To Use

I can use "plain English" commands with my computer to create files, process the information, and generate reports. I can add new data fields without restructuring the whole program.

And look at this — no more tedious, time consuming "sort, merge and purge" — the system uses 'data dictionaries' to organize information on the disk.

Now I can merge data from separate applications, with a single command — I just 'ATTACH' the dictionaries I want and all the information about my busi-

R/DESIGN

Menu driven program generator allows you to paint screens and knock out applications with incredible speed. Can also generate R/BASIC source code if desired.

R/BASIC

Powerful, structured, BASIC compiler with relational data base management extensions. Fine tune output from R/DESIGN — or build your application programs from scratch.

R/FILE

Build, modify and manipulate multiple data dictionaries — your fundamental key to Revelation's power. Total data management flexibility.



evelation Delivers.

ness is at my fingertips. Any number of files can be used simultaneously — and when I add new data, any number of files can be updated at the same time.

Other software contrains me with fixed field and record lengths. With Revelation, any item can reference any other item, with virtually no constraints. In essence, there are no limits. Variable field lengths really make efficient use of disk space, too.

Revelation is more than a relational data base management system, upward compatible with 'big' computers. Cosmos has thought of everything — including an applications generator, structured BASIC, and communications capabilities. It certainly is complete.

Total IBM PC Compatibility

Most importantly, this 'operating environment' is used in conjunction with †MS-DOS. I can run all my IBM PC and MS-DOS software without any modification. The system also allows me to move data from MS-DOS or †dBASE II and even download or access data from a minicomputer or mainframe. All the data that was keyed-in using our old software is easily transferred via Revelation — with no re-keying.

Think I'll run on over to visit my friend who got me started with these micros. I'll bet he'll be excited about its superior technical capabilities. At last, I've found a data management system that delivers fast, accurate information the way I want it.

R/LIST

Report generator that offers the flexibility of a mainframe or minicomputer, designed for the novice. Format and output any kind of report with no programming experience.

UTILITIES

All the bells and whistles. Spool to the printer to take advantage of your computer's speed. Superior editor makes changes easy.

DATA TRAVEL

Communications plus terminal emulation. Attach data dictionaries from remote systems. Upload and download information from mainframes, mini or micros. Transfer data from existing applications.



Makes managing data in a business personally more effective.

Technical Specifications

Revelation is an extraordinary relational DBMS and applications development environment. Any number of files can be used and updated concurrently. The number of records per file is limited only by disk space. There is a logical limit of 65,000 fields per record and 65,000 characters per field. Because of the data management philosophy embodied in the system, it's a virtual environment and its limits are transparent to the user.

The screen builder and applications generation facilities output modifiable BASIC source code. Password protection is supported. Communications capabilities include terminal emulation and upload/download, and remote data dictionaries can be attached. The system also includes a 255 character type-ahead buffer and a 64K printer buffer.

Support of the †Intel 8087 math co-processor is integrated and called automatically. This not only provides a complete set of high precision math functions. It's the key to the phenomenal speed of Revelation's relational data access.

Of course, code developed using Revelation is upward compatible with any computer running variations of the †Pick Operating System. And a run time module is available for system application developers.

System Requirements

Cosmos Revelation requires an IBM PC or XT compatible personal computer, including compatible PC's from Columbia, Compaq, Corona, Eagle, Leading Edge, Seequa, Sperry Univac and Televideo. And it supports a multitude of independently available hard disk subsystems.

A minimum configuration requires two double sided floppy drives; 320K of RAM (but 512K is recommended); †MS-DOS or †PC-DOS through revision 2.1, and the 8087 math chip. All DOS programs and data can be called and integrated effortlessly.

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†PC/DOS (IBM/DOS) is a registered trademark of IBM Corp.
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Letters to PC

No Casual References, Please

I really like your magazine, which is why my subscription already runs into the 1990s. However, there are two things you could do that would make it even better for me and for other readers.

First of all, start slashing your zeros. You could save a lot of needless debugging by distinctly separating the zeros from the O's.

Secondly, don't make casual references to things the way IBM does. IBM likes to say "with clever programming you can . . ." and then never tell you how to do this "clever programming." You've done the same thing in "Driving with ANSI.SYS" (*PC*, Volume 3 Number 7). On page 446, Stephen Smith writes: "Options for color are in the DOS manual." That just tells me that somewhere in DOS it tells you how to get color text control. I spent over 2 hours looking under a variety of topics and in the index and the table of contents. I've yet to find that secret. Please tell your writers to give a page number or section title when they give such vague references.

Michael McKim
Montgomery, Alabama

We've thought about slashing zeros, but it raises questions about when to slash and when not to slash. In some cases, they destroy readability. In others, the slashes are pointless, since the context is clear. Further, zeros and O's look different when typeset. So no slashed zeros.

By the way, if you're still looking for the values for color, they're on page 13-8 of the DOS 2.0 manual.

The Elusive PC Clone

With visions of great bargains in mind, several other individuals and I recently sent an emissary to Hong Kong in search of PC computer clones. After extensive searching on the Apliu Street mentioned in your article ("PC Piracy: Growing by Leaps and Boundaries," *PC*, Volume 3



Number 1), he was forced to return empty-handed. He was unable to find any PC clones like the ones described. He was able to locate several other types, including a Suntac PC-6000 PC-compatible for $2,300, but this price is considerably more than the article's claim of a $600 price tag. It would appear that the PC clones have gone the way of the buffalo. Consider me a disillusioned reader.

Lawrence Palkendo
APO New York

Checkmate

I spent the better part of an hour today flipping through your April 3 issue, looking for a chess game to run on my IBM PC. It was, indeed, a frustrating search, amid all the ads for languages, utilities, spreadsheets, database management systems, and all such things that keep the business world humming. My goodness, what a serious magazine! Here I am, the proud owner of a newly acquired IBM PC, with 128K of fun and frolic, and all your magazine wants to talk about is the newest business applications and why APL is good for me.

As you well know, chess is an ancient board game of great intellectual challenge, and it happens to be well-suited to the modern computer. How can it receive so little attention in a computer magazine as thick as *PC*?

Ken Dixon
Toronto, Ontario, Canada

Your wish has been granted: There is a chess game that will run on your IBM PC. It's called, appropriately, Chess, *and is manufactured by Parker Brothers, Inc. We hope you read the review of it in PC Arcade ("Kings And Queens," PC, Volume 3 Number 11) —Ed.*

A Place for Ada

I have just finished reading the March 20 issue of *PC* and, as usual, find it up to your typical high standards. The articles on C and UNIX were quite interesting, particularly when combined with the recent news articles surrounding the demand for C programmers and the compensation packages offered.

While C has found a very strong following, as a professional programmer I feel that, over the long haul, Ada will prove to be the next major standard language. My rationale has only little to do with the relative strengths or weaknesses of the two languages. As with all tools, each is best suited for specific tasks. My reasoning is based primarily on economics and scale.

Some years ago, IBM developed PL/I with the intent that it would become the all-purpose programming language to replace both COBOL and FORTRAN. It was to be applied to commercial, scientific, and systems projects with equal efficiency. However, because of the massive investments in existing software and the fact that there was no real retroactive benefit to be gained by conversion, PL/I sort of flopped.

Now the hot ticket is C. It's portable,

flexible, and all the good things we programmers like. But its impetus is vendor-driven. Ma Bell is attempting to create a market for its internal software products and seems to be succeeding so far.

Then along comes the Department of Defense, with billions of dollars to spend on software and its own language, Ada. The DOD has established absolute control of what Ada is and isn't. If the DOD doesn't certify it, it ain't Ada. Ada will probably be transportable and, like C, it will no doubt be the systems language used to develop a highly portable operating system. In fact, I would not be surprised if the DOD developed specifications for its own operating system for the same reasons that it developed Ada. If this does come to pass, both UNIX and C may find themselves in the shadow of the Ada environment. Time will tell if I am even remotely correct in my assessment. I do believe that Ada will soon be a major force.

Russell L. King
Medford, Oregon

Ada is not the COBOL of the eighties. It is a language designed for real-time signal processing. Defense and weapons systems will continue to be programmed in Ada, while payroll systems et al, will remain in COBOL.—Ed.

Kind Words

I thought Frank Derfler's article on the CS9000 was particularly well written, combining a delightful writing style with in-depth knowledge of the micro ("PC's Powerful Cousin: The IBM CS9000," *PC*, Volume 3 Number 5). Many thanks to your editorial staff for your contributions to the field of personal computing.

Cecil P. Webb
Danbury, Connecticut

Taking a PC to Bed

I don't see how the computer display screen can ever replace the printed word until it's small enough and portable enough to be read in bed ("The Death of Print?" *PC*, Volume 3 Number 8). There are millions of bed-readers out here awaiting such a development with bated breath.

Gail Anderson
Glenview, Illinois

Love My Zenith

In your series of articles about "The IBM Compatible Universe" (*PC*, Volume 3 Number 6), I was very disappointed that you didn't include Zenith's Z-100 series computers that are supposed to be IBM



PC-compatible. I have been running IBM's programs on my Zenith Z-120 (after some modifications), and they work beautifully.

Zenith has announced the new Z-150 and Z-160 computers and claims that they are also IBM PC-compatible. I love my Z-120 very much and believe it is better than the IBM PC, which I never liked. I plan to purchase the new Z-150 very soon.

Steven J. Feinsmith
North Woodmere, New York

Adding to Junior's Memory

Peter Norton's article "Unearthing the PC*jr*'s Secrets" (*PC*, Volume 3 Number 5) discussed the ability to expand PC*jr* memory beyond 128K. Norton states in the beginning of the article that this is possible to do, but the extra memory is not addressable as general-purpose program memory. I understand and accept his point.

My question deals with the separate point that he raises at the end of the article, which states that it is possible to replace the built-in ROM-BIOS using the cartridge ROM. Is it possible to correct the RAM addressing problem mentioned earlier by rewriting the ROM-BIOS on a plug-in cartridge?

Edward J. Carl
Kingston, New York

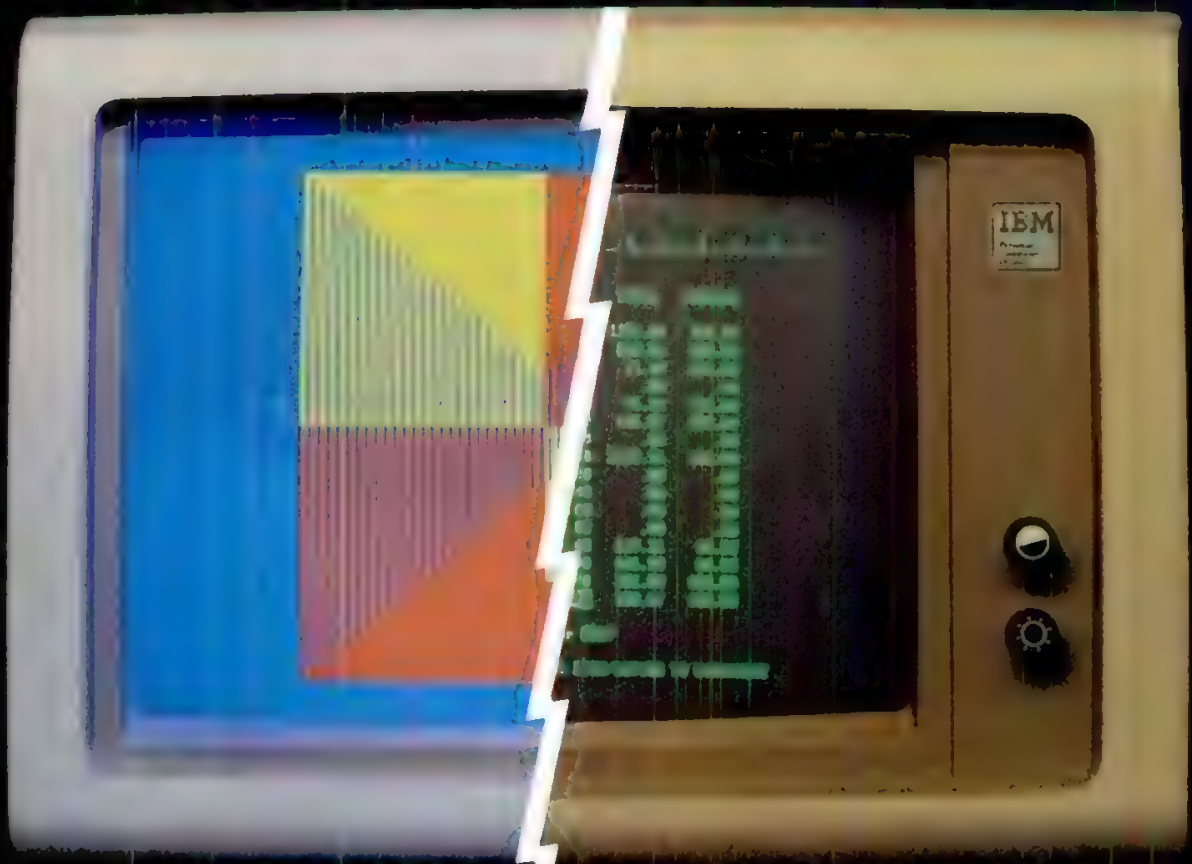
Peter Norton replies:
Yes, the Junior's ROM-BIOS can be temporarily overridden simply by plugging in a BIOS software cartridge. But no, that doesn't have much to do with the memory expansion issue. (By the way, the Junior's ROM-BIOS is much more complex than the PC's, so writing a replacement BIOS isn't a task lightly undertaken. Still, it can be done.)

*The PC*jr*'s memory can be expanded up to 640K just as easily as the PC's. Tecmar's* jr Captain *memory add-on and similar items from other manufacturers are clear proof of that. The kicker is the "hole" in memory.*

*The PC*jr*'s display screen uses 16K of ordinary memory. Although the location of the display memory can be shifted around, it cannot, as far as I know, be placed above the first 128K. So, if we add extra memory to a Junior, it won't be contiguous with the usable part of the first 128K: there will be a 16K hole from 112K to 128K, which the display uses. Neither DOS nor ordinary programs can make use of memory divided into two sections like that.*

*This quirky situation presents problems, but it doesn't mean that we can't use memory added to a PC*jr*. There are two ways that I know of that extra memory can be used. One is to let DOS use the regular low memory, and use the added high memory for a RAMdisk. That solves one of the Junior's worst problems: a slow diskette drive, and no second drive. The other way to use the memory is to, in effect, throw away the first 128K and have DOS and other programs work exclusively with the added memory above 128K. A very simple software trick—used by programs like* ProKey*—makes this solution easy to do.*

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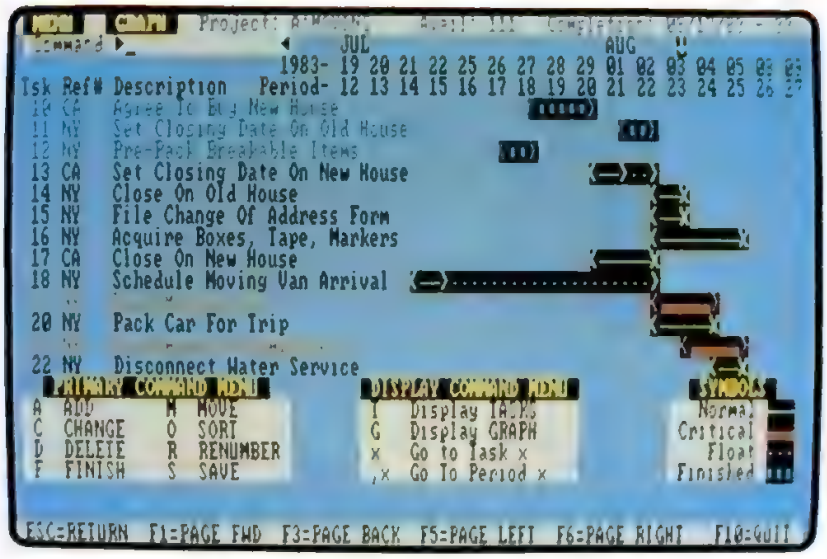
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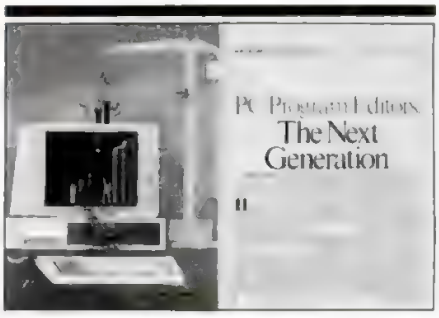
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CIRCLE 451 ON READER SERVICE CARD

LETTERS TO PC



A Better Editor

Stephanie Stallings' review of program editors was thorough, accurate, and relevant ("PC Program Editors: The Next Generation," *PC*, Volume 3 Number 5). While the screen-oriented editors reviewed are useful and certainly an improvement over earlier editors, there is a more advanced editor that will save time and allow programmers to concentrate on the creative aspects of programming.

I am referring to *FirsTime*, a series of language-specific editors for C and Pascal. *FirsTime* knows the rules of the language being programmed. It checks each statement as it is entered, and if it spots a mistake it identifies it and positions the cursor at the error so it can be easily corrected. *FirsTime* will identify all syntax errors, undefined variables, and even statements with mismatched variable types. Any program developed with the *FirsTime* editor will compile on the first try.

Homi M. Byramji
Spruce Technology Corporation
Lincroft, New Jersey

Cutesy or Not?

Imagine the following scenario if you can. You and a friend write a computer fix-it book. It is an instant success. Then, just when you feel that the reaction has been 100 percent favorable, you pick up a magazine and find a review that says your book has "syntax errors" and "typos" and is written in "infuriatingly chummy and colloquial" language. You have taught thousands of people how to fix computers, and a deskbound reviewer thinks your writing is cutesy. Even more important, you found a safe shortcut to

keep beginners out of the soup, and the expert says that Ph.D.'s in electrical engineering don't do it that way.

The facts presented above are just what happened to us with our book *dBASE II in English I*. We think you should take a look at the review written by David Obregón ("Help For Experts And Novices," *PC*, Volume 3 Number 5).

Frankly, we are amazed that you gave our *dBASE II* book to an advanced *dBASE* user to review. Since we claim that it will teach any novice to program in *dBASE II*, it would seem that you might have had some real fun by giving the book to a secretary, or to someone on the night clean-up crew, or to your grandmother. We think that would have been a good test. Were you to use it, you would end up with a *dBASE II* programmer on your hands every time.

We have taught ordinary people how to program in *dBASE II*, and we are being richly rewarded for our efforts. The choices are really quite clear. Either our readers are right and we have a super product (as we believe we do), or our readers are idiots and your reviewer alone stands for the truth. Come on, now, which side would you be on?

Larry and Steven Doroff
Chicago, Illinois

David Obregón replies:

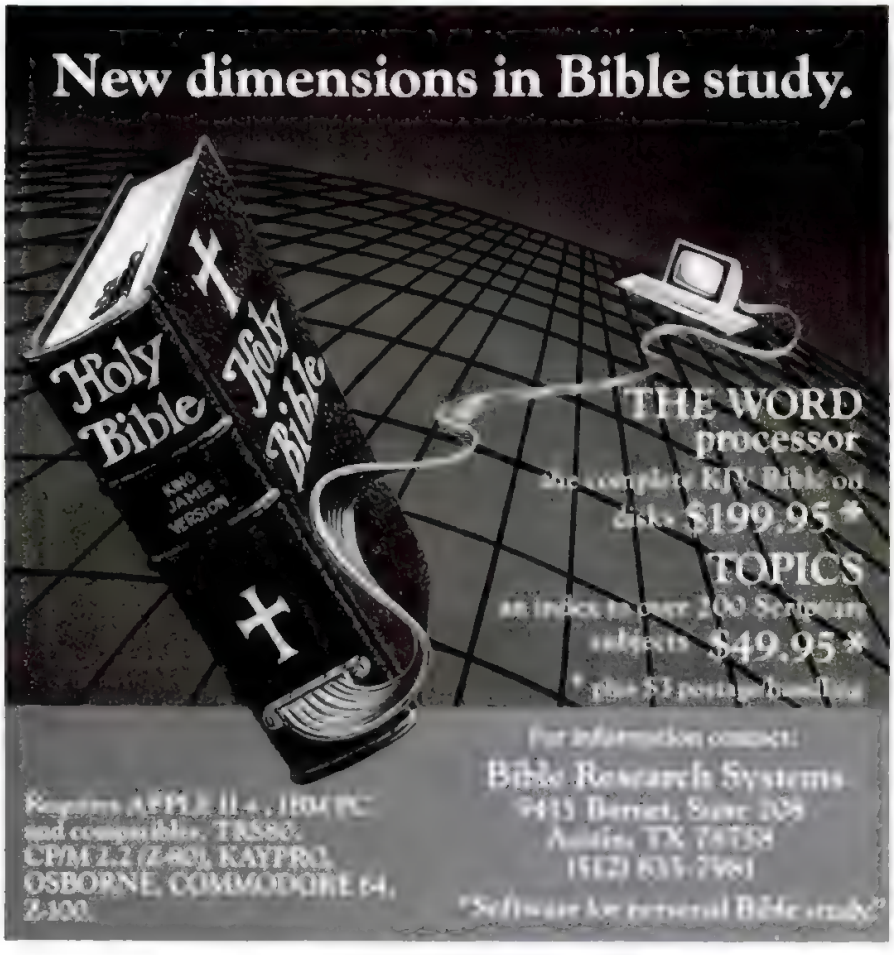
The criticisms made in my review of the book, completely unaddressed by your letter, are valid. Good programming practices evolve as a result of experience on the part of thousands of programmers. Sloppy practices come about when new programmers hit upon something that works, however inelegantly, and stick with it. Most of the time inelegant solutions work only for the particular programmer using them. Had more time been spent in the writing of dBASE II in English I ***and had more effort gone into exploring the*** dBASE II ***programming practices that have evolved since the program was first released, there would have been less to criticize in the book.***



CIRCLE 118 ON READER SERVICE CARD



CIRCLE 148 ON READER SERVICE CARD



CIRCLE 106 ON READER SERVICE CARD

LETTERS TO PC

Not A Mock-up

In "Armed For Learning 1-2-3" (*PC*, Volume 3 Number 7), William K. Howard states that "Disk tutorials catch your mistakes and they're better for reviewing than cassettes. But none of the aftermarket tutorials actually run *1-2-3*; they run a mock-up."

There is a product, *Putting 1-2-3 To Work*, available from National Training Systems, Inc., that actually runs the *1-2-3* software parallel with a series of templates on disk and workbook exercises. The product actually teaches application of Lotus' *1-2-3* to solve business problems and, in the process, helps the user learn to apply commands and features to realize the full benefits of *1-2-3*. Our program can be purchased from NTS, 1111 Broadway, Santa Monica, CA 90401.

Keith Bronnitt
National Training Systems, Inc.
New York, New York

Corrections:

There was a typographical error in "Creating Quality Courseware" (*PC*, Volume 3 Number 8). The author language program, Coursewriter, is part of IBM's IIS system.

Those who want more information on the *Dapper* engineering program described in "Dapper's Rite of Passage" (*PC*, Volume 3 Number 7) should contact SKM Systems Analysis, Inc., P.O. Box 3376, Manhattan Beach, CA 90266, (213) 546-6121.

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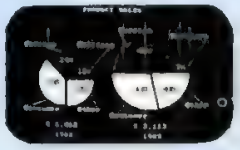
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100% compatible with the IBM Monochrome Adapter Board, IBM's highest quality text mode	YES	YES			YES	YES	YES	
100% compatible with the IBM Color Graphics—for RGB and composite video monitors, lightpen	YES		YES		YES	YES		
Operate standard IBM Color Graphics software on the IBM Monochrome Display—(Lotus Graphics, etc.)	YES						YES	
Connect two monitors simultaneously and switch either by software or an external switch	YES					YES		
Graphics resolutions on the IBM Monochrome Display of 720 × 700, includes advanced software support	YES			YES				
Graphics resolution on an RGB Monitor of 640 × 400 with 16 colors, includes advanced software support	YES				YES			
Requires device drivers to operate Lotus 1-2-3 Graphics on an IBM Monochrome Display	NO			YES	YES		NO	
Includes a standard IBM Parallel Printer Port	YES	YES		YES		YES	YES	YES
Operate with a standard television set	YES		YES		YES	YES		

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Make Sure The Price Is Right

When you're ready to put a price tag on your do-it-yourself software masterpiece, do keep in mind that you aren't the only one who will be profiting from its sales.

We began, in the last issue, to take a look at the do-it-yourself kitchen table software business. We worked out an estimate of what it would cost to produce a typical small PC software package in the customary vinyl folder: about $5 a copy, exclusive of overhead and the mental effort expended to create the software itself.

Now let's look at what you can sell your product for. If you don't know the customs of distribution and mark-ups—and most of us really don't—then you may be in for some shocks.

For the moment, we'll ignore the official list price of your product, or what it ought to be. We'll come back to that subject later. Instead, let's consider everything in terms of a percentage of the list price as is the custom in discussions of distribution and pricing.

Slicing Up the Pie

If we're lucky enough to sell our software to the end user at 100 percent of the list price, that's all gravy for us. Unfortunately, we can't get it very much of the time. If we want to sell as many copies of our programs as possible and make as much money as possible, we have to get retailers, distributors, discounters, and others involved and give each a slice of the pie. As it turns out, they expect a bigger slice than most people imagine.

It's customary for a retail store to buy its goods at roughly 60 percent of the list price. It sounds as though they're getting 40 percent of your customer's dollar, but retailers have rent, salespeople to pay, and lots of overhead costs. Retailers don't bank much of their 40 percent cut.



Peter Norton

The same holds true, by the way, of the mail-order discounters. Discounters save overhead and pass it on to the end-user. They typically sell at about 70 to 75 percent of the list price and cover their costs and profit on a margin of 10 to 15 percent instead of the retailer's 40 percent.

If you're lucky enough to be selling directly to retailers and not being buried alive in the process, then you're doing very nicely to be getting up to 60 percent of the list price of your programs. There is a good reason, though, why software distributors exist. Distributors act as buffers between software producers and computer retail stores. A retail store can turn to a distributor for one-stop shopping instead of ordering from dozens of suppliers and trying to keep track of who ships quickly and reliably and who takes frightfully long to send the goods. From the point of view of a retailer, the distributor smooths out the uneven response time from software producers. Budding software producers like us get a lot from distributors as well: one source of orders instead of a flood of phone calls from many stores, a sales force that knows all those computer stores, and an accounting department that knows how to pay its bills.

Distributors get their own slice of pie. Retailers buy from the distributors at about 60 percent of list, and the distributors expect to buy from us at no more than 40 percent of list. Often they will require a price as low as 35 or even 30 percent.

The Publisher's Piece

If you end up selling your product for about 35 percent of the list price, you make a lot less profit than you might have expected. Let's suppose that you've created a game or some other piece of software that can't sell for a high ticket price. Typ-

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ical game prices are $30, $35, $40 tops. Let's slice up the pie on a $30 product.

The customer pays 100 percent, $30. The retailer pockets 40 percent, $12, to cover costs and profit, passing on $18 to the distributor, who pockets 25 percent or $7.50. You get your 35 percent, some $10.50. But unlike everyone else, you've got the actual production cost, which we ball-parked in last month's column at $5, so your gross profit is a mere $5.50. For you, though, that's just a gross—out of it you have to cover your overhead, including any advertising you might be doing. Whatever is left is your profit as software author and software publisher—not sudden riches in anyone's book.

If we give our distributors and retailers a fatter profit slice, they have more incentive to sell our programs.

We've been assuming all along that you're both author and publisher of your own software. What if you don't plan on wearing both hats? Perhaps you've written something and you'd just as soon let someone else have the hassles of publishing it.

Although any kind of deal can be struck, the software publishing business has settled down to some stable standards that closely match the customs of the book publishing business. An often-quoted figure is a royalty to the author of 15 percent of the publisher's gross. That's not, as many people assume, 15 percent of the list price. In the case of software publishing, it's typically 15 percent of 35 percent of the list—or a net royalty of about 5 percent of list. For our hypothetical $30 software package, the royalty would be about $1.50 on each copy. That's far from a fat slice of the pie, but the author is relieved of all the business of making and selling and is responsible just for creating (which the business world never considered an important activity anyway).

The percentages that apply to the retail and wholesale level of trade aren't cast in bronze by any means. Needless to say, the likes of you and I aren't going to get a bigger percentage. If anyone has the muscle to get a bigger share, it won't be us—we may have to accept a smaller share simply because we are dealing with someone who has the clout to make us. The very first distribution deal I signed gave me what I thought was an outrageously low percentage of the list price and outrageous terms. I needed that distribution deal at almost any price, so I gulped and accepted the numbers! For a long time I complained bitterly (to myself) that I was being taken advantage of. But I was getting distributed, I was getting sold, and I was making money. From that perspective, even though I felt I was being had, it was all very much to my advantage.

The Incentive Plan

There are also good reasons why we might voluntarily accept a thinner slice on our own initiative—it's called incentive. If we, as software producers, give our distributors and retailers a fatter profit slice, they have a little more incentive to sell our programs. In a competitive market, that useful edge could make up in more sales the profit margin we gave up.

One of the computer chains that I deal with doesn't take a distributor's mark-up when it resells software to the stores in the chain. It gets its profit elsewhere, so it doesn't have to buy software at a typical distributor's 40 percent price—it can afford to pay a retailer's 60 percent price. When I made my arrangement with this chain, though, I decided not to be greedy: I gave it a much better than 60 percent price, knowing that the discount would be passed on to the stores and give them more profit incentive to sell my programs. It seems to be working.

It should be clear now why so much software is priced in the hundreds of dollars. It takes lots of investment in teams of programmers and in advertising to get big, serious software onto the streets. While a kitchen table software house might be able to thrive on a gross profit of $5 or $10, Ashton-Tate, MicroPro, and Peachtree can't. If a software publisher needs $100 gross profit to pay those hungry programmers then his or her product is going to have a list price in the $300-to-$400 range. That's how it goes.

If you are debating the price to put on your programs, there are two main ways that you can approach it. You should work out both approaches and see how closely they meet in the middle. Start with what you want the list price to be. Consider what buyers are likely to expect. For games, there's a pretty well-established $30-to-$40 normal range; in the case of, for example, word processors, there is a wide range of existing prices. Then decide if we want our product to have a "normal" price or be higher or lower than normal. High-balling can succeed but often doesn't. (I remember a short-lived series of ads for some business software priced in the $2,000-to-$3,000 range—it disappeared without a trace.) Low-balling can either succeed or make the public think you have a low-quality product.

Working Both Ways

Once you have determined the "right" price, you can work backwards to arrive at the gross profit it should give you. Then try deciding how much gross profit you need to cover your expenses and advertising, and work forward to a list price.

If you're lucky, these two methods will help you arrive at a price. If your two results are wildly out of line with each other, you may need to do some major rethinking. You might decide to scale back expenses like advertising, push the price up beyond "normal," or decide that the whole thing is unworkable. The pricing debate is a unique opportunity for you to really evaluate how sound the idea of starting your own business is. ■

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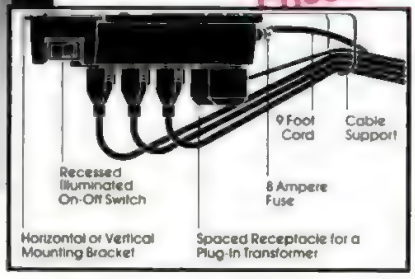
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80 Micro magazine "studied three other daisy-wheel printers under $800 and came to the conclusion that the Juki 6100 was by far the best choice. It's smart, has plenty of features. . . the print quality is excellent." That's because the Juki uses print wheels and ribbons designed not for computer printers but typewriters — where standards for "letter quality" are set. Smart? The print wheel simply drops into place; the printer engages it automatically!

Fast? The Juki is rated at 18 characters a second. But logic-seeking bi-directional printing and high speed motion over blank spaces means typing speed for typical text equals printers with much faster ratings. *Creative Computing* says "the Juki [is] much faster than other low cost daisywheels. . . the printhead absolutely flies over white space." And there is a built-in 2,000 character buffer.

Quiet? Better than 62 dBA from 1 meter away. No raucous clatter. A big improvement over some printers we listened to. We benchmarked the Silver-Reed EXP 550, Brother HR-1, and Smith-Corona TP-1 and found them two to eight times noisier. *80 Micro* agrees: "The Juki 6100 is one of the quietest daisy-wheel printers." Reliable? Ask an engineer about an MTBF of 2500 at 25% duty. Other printers employ intricate wires, pullies, and springs. They derail, and go out of adjustment. The Juki is elegantly simple, with few moving parts: the print head is drawn across a rail by magnetic attraction.

Versatile? It prints at 10, 12 and 15 characters/inch on a 13 inch platen (11 printable inches). Also supports proportional spaced print wheels. Under software control there are almost 50 codes for graphics, special type wheel characters, and even reverse direction paper feed. Spacing can be controlled up to 1/120th of an inch horizontally and 1/96th inch vertically for the fussiest forms printing. We offer an economical and reliable bi-directional forms tractor as an option for continuous stationery. Works with up to 7-part stock!

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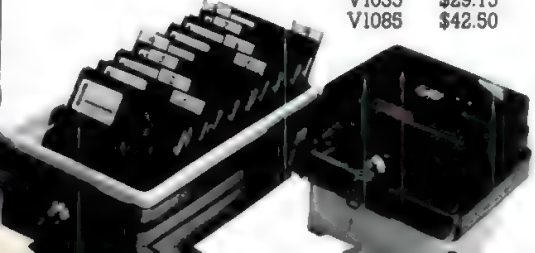
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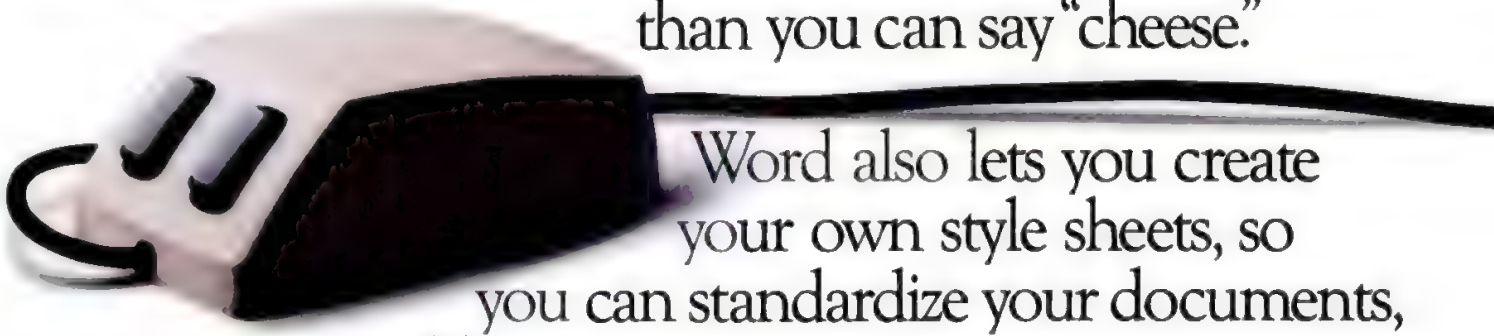
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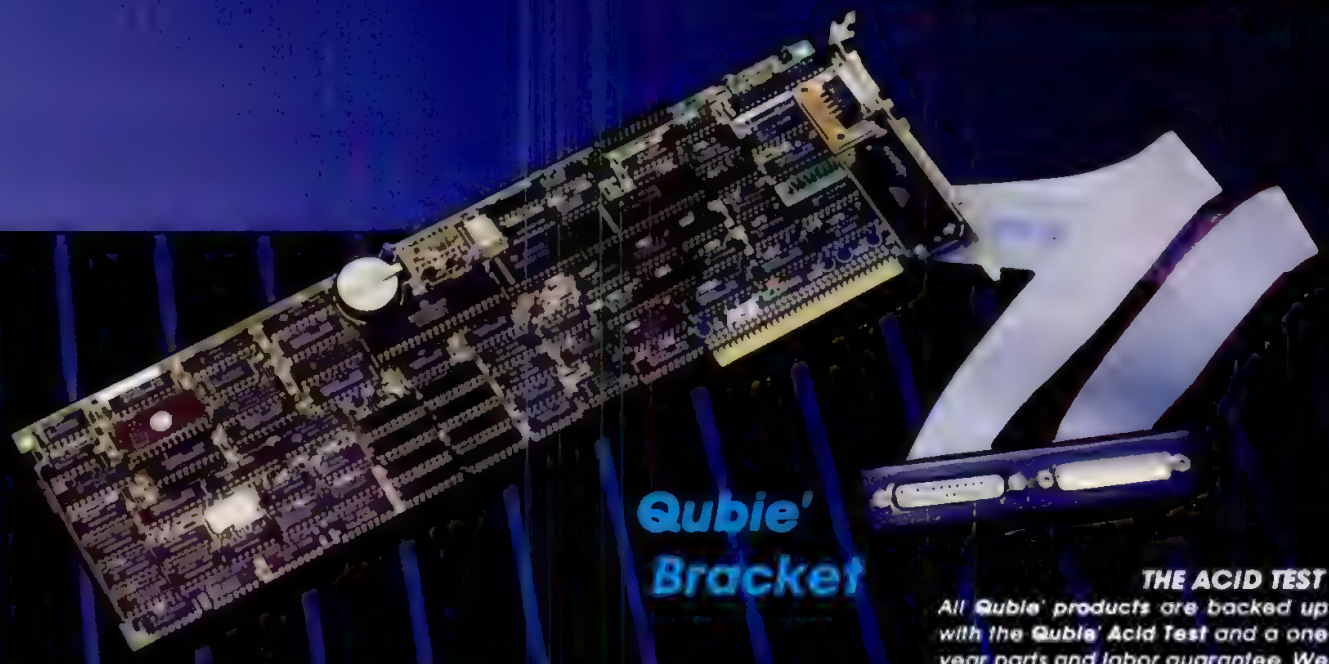
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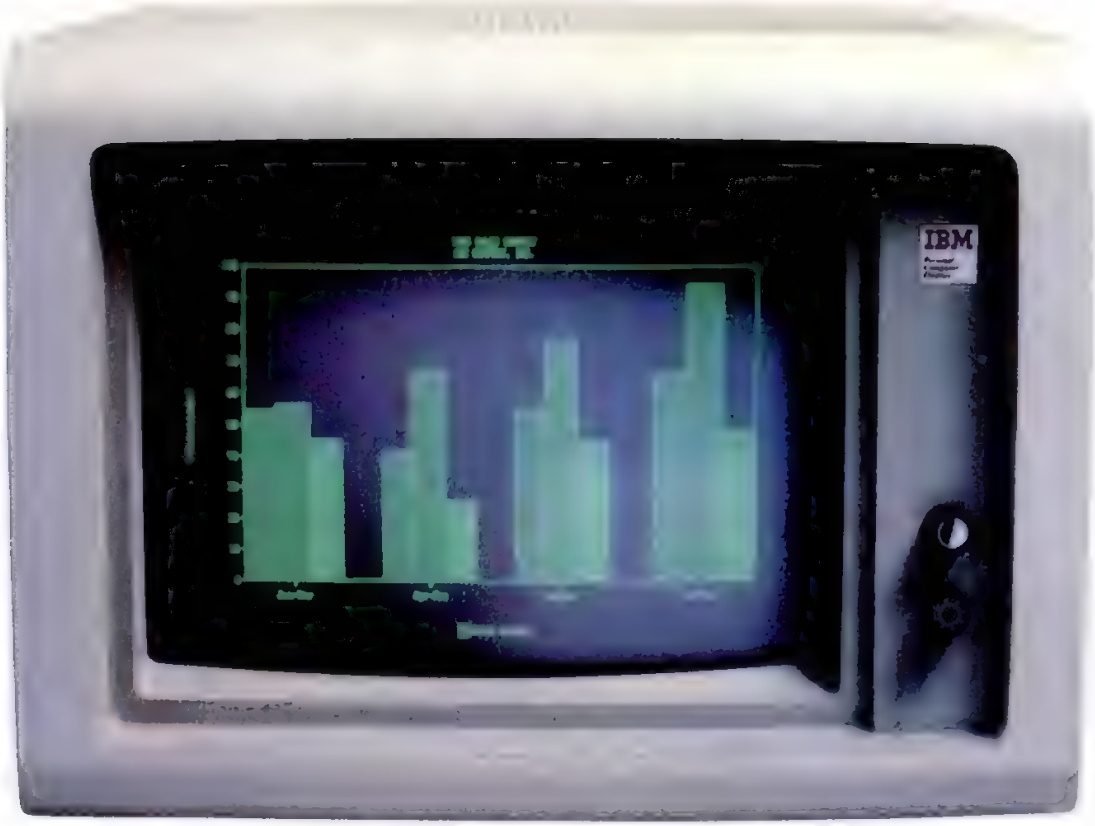
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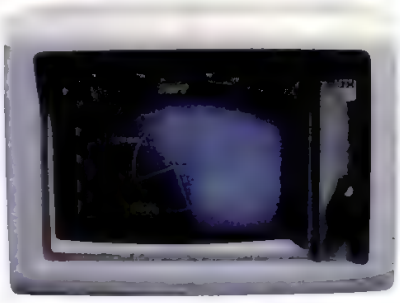
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Parallel port	Standard	Standard	Standard
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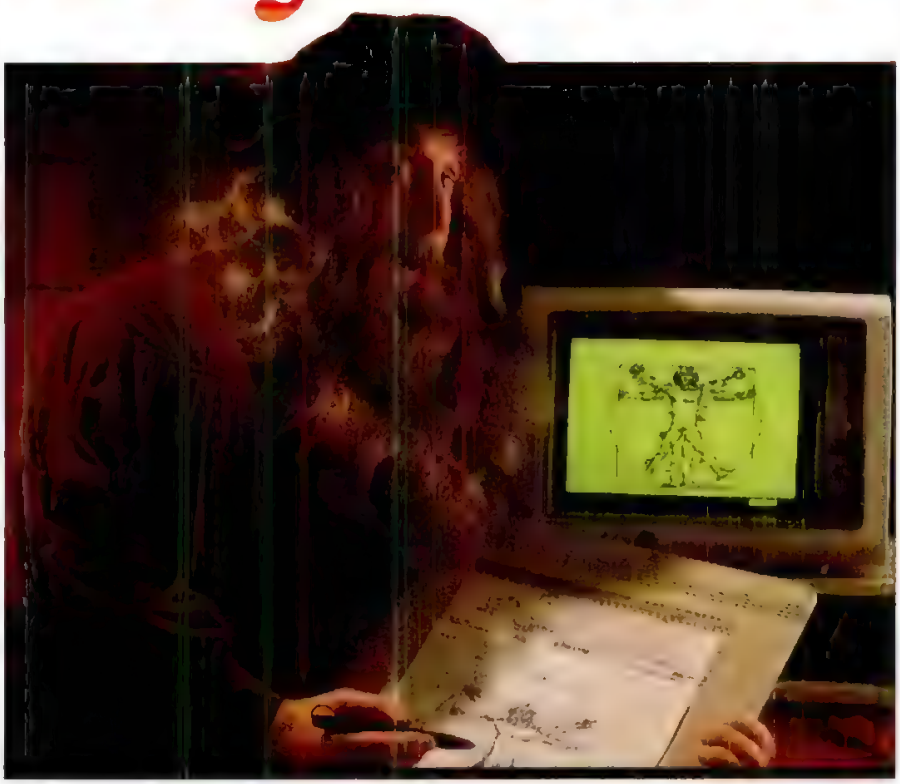
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ALTERNATE INPUT: Beyond the Keyboard



Photograph: Dennis Chalkin

Though the familiar keyboard is still the dominant method of inputting information to your PC, new breeds of alternate input devices are beginning to find their niches. They offer capabilities that keyboards simply can't duplicate.

Once there was only the keyboard. If you wanted to create anything with a PC you had no other choice but to sit down and type in strings of symbols on a typewriter-like keyboard.

More recently, the keyboard has been joined by the mouse, which allows the computer user to interact with the computer without typing in commands. Simple movement can be translated into preprogrammed commands or actual images on the computer's screen.

Beyond both of these common input systems lies an expanding world of alternate input devices. These range from complex graphics tablets to simple joysticks and trackballs. In between lies an exciting array of products that use light, movement, or voice to produce information the computer can use.

Tablets—flat, bounded surfaces whose area is directly tied to the computer's screen—allow you to draw the image that appears on the screen with colors, textures, and patterns. Because tablets let the creator draw instead of program, they produce a level of art and design never before possible with PCs.

Bar code readers use laser light to read the stark black and white bars of the Universal Product Code. Not only does this capability offer potential applications for PCs in product recognition; the compact bars have been touted as a new means of saving programs so they can be input with a flick of the wrist.

Voice is just beginning to enter the PC universe, but the first products clearly show the potential for speedy natural interface that the voice offers. A computer we can speak to would provide a new level of intimacy in the deepening relationship between humans and micros.

While the keyboard remains king of the input devices and the mouse is clearly crown prince, the kingdom is no longer theirs alone. Democracy has come to PC input.

COVER STORY

Drawing Conclusions About Touch Tablets

Touch tablets allow you to create images on your computer's screen in much the same way you would draw on paper.

PC Magazine takes a look at KoalaPad, Chalk Board Powerpad, VersaWriter, Space Tablet, and PENPAD.



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A series of drawings showing some of the steps that go into creating a finished piece of art on a touch tablet.

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KoalaPad Versus Powerpad

You may be aware that a new input device called the "touch tablet" has appeared on the scene, but perhaps you don't know exactly what it is.

A touch tablet is a device with a touch-sensitive membrane that allows you to draw freehand on the computer screen in much the same way you would sketch on paper with a pencil or brush. When you move your finger or a plastic stylus across the tablet surface, the device transmits *x-y* coordinate positions to the computer. With the right software, your hand motions can be mapped on the computer's screen. Touch tablets are fast and efficient; they are sturdy and therefore ideal for home or classroom use. Manufacturers of these devices have made low cost a higher priority than high resolution and precision. As a result, drawing with a computer has become available to a much wider audience than ever before.

Two newcomers to the market—Koala Technologies of Santa Clara, California, and Chalk Board of Atlanta, Georgia—are now primary contenders in the touch tablet race. These two companies were the first to produce touch tablets for a wide range of popular computers and to offer extensive software libraries. Both companies bundle a two-dimensional graphics program with their tablets, and both target the educational market with optional packages to teach logic, music, or other skills to young people.

These products first appeared for the Commodore 64, Atari, and Apple II computers. Koala Technologies now offers a PC version. Chalk Board's PC version is still in prototype form, but I was able to test it.

KoalaPad
Koala Technologies Corporation
3100 Patrick Henry Dr.
Santa Clara, CA 95052-8100
(800)KOA-BEAR, (408) 986-8866
List Price: $150
Requires: 128K RAM, DOS 2.0, one disk drive, game adapter, color graphics card.

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How the Products Compare

The most obvious difference between the KoalaPad touch tablet and the Chalk Board Powerpad Touch Tablet is size. The overall dimensions of the KoalaPad are 6 x 8 inches, with an active area only about 4 inches square. According to a Koala engineer, this small size was chosen for user convenience. The Chalk Board Powerpad measures 17 x 19 inches. Its 12 x 12 inch active area is as large as those of many digitizing tablets and gives ample space to configure large menus directly on the tablet. The Chalk Board Powerpad exploits its large tablet size by providing removable Mylar menu overlays for the tablet that are custom designed for use with specific programs.

Although both products use touch-sensitive membranes, the internal electronics differ substantially. The KoalaPad, like most touch tablets before it, uses analog technology. When pressure is applied to the KoalaPad surface, two resistive surfaces form a contact. The resistance is measured by the tablet electronics, which provide an *x-y* coordinate value. This value is converted to a digital value at the computer interface, which, in the PC, is the game adapter. Since joysticks use a similar analog/digital conversion principle, the KoalaPad looks like a joystick to the game adapter.

This method has its advantages. The game adapter is already available as an interface and, because the KoalaPad functions like a joystick as far as the game adapter is concerned, software designed for joysticks often works with the KoalaPad.

One Point At a Time

A disadvantage of using the game port is that it limits the resolution of the devices to 256 x 256, or 1 byte. However, this resolution can be easily mapped to a screen resolution of 320 x 200 or 640 x 200 by using scaling factors in the software. A limitation of the analog technology is that only one point may be registered as input at a time.

Chalk Board, in contrast to Koala, employs digital instead of analog technology throughout the Chalk Board Powerpad. The tablet's touch membrane contains 14,400 digital switches that are scanned 20 times per second for contacts induced by pressure. Resolution is 120 x 120 (10 switches per inch), lower than that of the KoalaPad. It must be scaled with software to map the tablet resolution to the screen resolution.

One advantage of digital electronics is that you may select more than one input point at a time. This means that using the proper software you could press your entire hand down on the tablet surface and a complete handprint would appear on the screen. An analog tablet would register only one point in such a case.

The digital technology used by Chalk Board has some disadvantages, however. One problem is that the tablet may not be used with the IBM PC game adapter. It



The KoalaPad from Koala Technologies.

needs the serial interface card provided by Chalk Board, and this means giving up a precious PC expansion slot. Programs that support joysticks will not support the Chalk Board Powerpad without some alteration. Also, the component count is higher: the Chalk Board Powerpad contains 43 integrated circuits while the KoalaPad has only six. Lastly, increasing tablet resolution above 10 switches per inch raises cost substantially; it slows operation because more switches must constantly be scanned.

The Deciding Factor

The software ultimately determines how the products can be used. Currently Koala Technologies offers only one software package for the PC version of the KoalaPad. This is *PC Design*, a general-purpose, graphics "toolkit" that's bundled with the KoalaPad. Chalk Board's software offering is *Chalk Board Super Graphics*, a graphics toolkit that it bundles with the PC Chalk Board Powerpad.

Koala's *PC Design* is an easy-to-use, easy-to-learn, menu-driven program for general, two-dimensional graphics creation. It's a pixel-based program, which means it stores images in memory at the resolution and in the format of the graphics display. This differs from a two-dimensional computer-aided design (CAD) program, which stores images in a list format at a resolution much higher than the graphics display.

PC Design makes extensive use of a menu screen with icons, so you must constantly switch between the menu and the graphics screens. The menus and icons are well thought-out, so you seldom need the documentation to learn the program. It's simple, yet sophisticated enough to create serious graphics.

The program, written in interpretive BASIC, contains many graphic commands for on-screen image creation, such as CIRCLE, LINE, BOX, AREA MOVE, COPY AREA, TEXT, FREEHAND DRAW, TEXTURE FILL, and BRUSH SELECTION. A bar chart and pie chart feature is also included.

Using the KoalaPad and *PC Design* is a pleasure. You can lose yourself for hours dabbling with images. There are some drawbacks, however. A fair amount of pressure is needed to register a point when drawing, but in some respects this is good, because an inadvertent light touch will not register. When the KoalaPad is used in the FREEHAND DRAW mode, an insufficiently firm touch will unexpectedly send a line shooting to the upper left corner of the screen. This is usually no problem once you become familiar with the tablet, but if you tire later in a session, it is possible to get careless and wreak havoc with a carefully created image.

The KoalaPad's response time is adequate, but slower than I would like. If you draw quickly using the FREEHAND DRAW command, your hand may get ahead of the software, which will force you to slow down. When you draw freehand curved lines quickly, some points are skipped and straight lines appear between points on the screen.

None of the KoalaPad's problems are crucial, and all could be minimized by software improvements, but they do present an obstacle to natural freehand drawing. A Koala spokesman said that a software update correcting the system's

Chalk Board Powerpad Touch Tablet
Chalk Board, Inc.
3772 Pleasantdale Rd.
Atlanta, GA 30340
(800) 241-3989, (404) 496-0101
List Price: $199
Requires: 128K RAM (with DOS 2.0) or 64K RAM (with DOS 1.1), one disk drive, color graphics card.

CIRCLE 793 ON READER SERVICE CARD

problems will be released soon.

Chalk Board Super Graphics, a pixel-based program written in C language, has many graphics commands in common with Koala's *PC Design*, but with several differences. *Super Graphics* takes advantage of the Chalk Board Powerpad's multiple-point input capacity. Also, because of the tablet's large active area, menus can be configured directly on the tablet instead of the screen and are referenced by Mylar overlays. You don't have to toggle constantly between the drawing screen and the menu screen. It can give your eyes a break, too; you aren't always staring at the CRT.

The program emits a musical tone each time you use a graphics command. It also corrects circle aspect ratio to give true circles instead of ellipses, a useful feature not found in *PC Design*. Unfortunately, it has no TEXT command, although individual characters can be created, stored, and called up as symbols. This is okay for designing logos, but a nuisance for quickly creating labels or headings. The lack of a TEXT command may indicate that Chalk Board favors the fine arts and educational markets over commercial art and business.

Super Graphics is slightly more difficult than *PC Design* to learn and use, but is a little more comprehensive. From time to time you will need to refer to the reference manual that augments the tablet menu. The FREEHAND DRAWING mode has a different feel than that of the KoalaPad but is similar in speed. The tablet requires about the same amount of hand pressure, although you must move your hand over a larger area. This program, like *PC Design*, creates straight line segments between points if you draw fast freehand curved lines, but it does not allow lines to jump occasionally to the upper left-hand corner of the screen.

The KoalaPad has two buttons above the tablet surface that emulate joystick but-

Low prices have made drawing with a computer available to a wider audience than ever before.



These drawings, which were produced by Allen E. Meilach, emphasize freehand graphic input using the KoalaPad, *PC Design* software, IBM PC middle-resolution graphics, and the Amdek Color II Plus monitor.

tons. You can draw with one hand and use the other to push the buttons for frequently used commands such as ENTER. As an alternative, a tablet section could be defined by software to represent any command, but the buttons are easier on the thumbs. Since the Chalk Board Powerpad doesn't have buttons, your thumbs may get a workout from the constantly used LOCK ON, LOCK OFF, or PEN DOWN commands.

Neither program has true animation capabilities. A nice addition to both packages would be the capacity to store the steps used in creating an image, then replay that sequence rapidly to create an animation effect for product demonstrations, educational packages, and so on. A FLOAT command to animate a stored symbol or image would be a nice extra. A Chalk Board spokesman said that when *Super Graphics* goes on the market, it will offer a slide-show sequence to display saved screens one after the other in rapid succession.

Another feature lacking in both programs is an OOPS or TEST command. An OOPS command would let you cancel your last image alteration if you don't like the way it looks. A TEST command would allow you to preview an alteration before it becomes permanent.

A font library would also be nice for loading custom fonts to be used with the TEXT command. Koala Technologies presently supports only standard IBM ROM fonts, while Chalk Board lacks a TEXT command entirely.

The KoalaPad's resolution of 256 x 256 (236 x 236 actual) is considerably higher than that of the Chalk Board Powerpad's (120 x 120; 107 x 100 actual). Software scaling factors can map a tablet resolution to any screen resolution, but there is a drawback to this. Theoretically, a low-resolution tablet mapped to a very high-resolution screen might make circles begin to appear as polygons. In practice, however, the lower resolution of the Chalk Board Powerpad isn't noticeable when used with the 320 x 200 IBM medium-resolution graphics screen and *Super Graphics*. Also, *Super Graphics* has a SCALE command that temporarily maps a small screen section to the entire active tablet area. Because this command maps tablet points to screen pixels on a one-to-one basis, it minimizes inaccuracies that may result from scaling. *Super Graphics* also has a MAGNIFY command for zooming in to work on individual pixels, a feature lacking in *PC Design*.

PC Design uses only four-color, medium-resolution PC graphics, although the optional KoalaPad programmer's manual shows you how to write your own high-resolution PC programs. *Super Graphics* supports four-color medium-resolution PC graphics and 16-color, low-resolution graphics. High resolution could be achieved with user-written programs. I would like to see both tablets support enhanced-featured video cards such as Amdek's MAI card or Plantronics' COLORPLUS, which would increase the color palette for more exciting possibilities.

Koala Technologies uses the DOS 2.0 Epson printer driver for hard copy. My prototype of Chalk Board's software contains a custom driver for the Quadjet ink jet printer. A Chalk Board spokesman said that the version it puts on the market will be configurable for several popular black-and-white and color printers. Both programs have utilities to save and load screen images and to view file directories while in the program.

The multiple-point input feature of the Chalk Board Powerpad paves the way for many exciting applications in the educational arena.

Beyond Graphics

Although both of these aggressive companies bundle a general-purpose graphics toolkit package with their touch tablets, the creation of graphics images as an end in itself is only a small part of their marketing thrust. Koala Technologies is actively preparing to enter the educational market with software for the PC KoalaPad, following up on the software it already offers with the KoalaPad versions for the Apple II and Commodore 64. Koala plans to announce new educational packages for the PC version of the KoalaPad during 1984, but none are yet ready for testing. Because the PC is used widely in businesses, Koala is also developing business applications for the PC KoalaPad. A CAD (computer-aided design) program should be announced in the second quarter of 1984.

Koala Technologies provides an excellent programmer's guide as an option and encourages users and other software developers to support the KoalaPad. Several other software producers support the versions of the tablet for the Apple and Commodore, and support is likely to follow for the PC version.

Chalk Board also stresses a heavy commitment to the educational market. It employs an interdisciplinary programming staff that is currently developing packages to teach children logic, math, science, music, and numerous other subjects. It will soon release *LogicMaster*, a game for children that entertains them while they learn simple logic by matching graphic shapes.

The multiple-point input feature of the Chalk Board Powerpad paves the way for many exciting applications in the educational arena. For example, a piano keyboard could be configured on the tablet and defined by a Mylar overlay. With multiple-point inputs, chords could be played as well as single notes and the Chalk Board Powerpad could become a music teacher.

A touch tablet could also emulate a computer keyboard, if properly config-

ured through software. The software could define areas of the tablet surface to represent characters, while Mylar overlays guide you to where the keys are located. Since most computers come with keyboards, this might not be practical, except for small children or adults who can't type. Characters may be arranged in alphabetical order instead of QWERTY or Dvorak layouts.

Touch tablets could begin to appear on every desk next to a keyboard.

This keyboard example illustrates the flexibility in configuring any kind of menu on the tablet surface. Touch tablets are not limited to freehand-drawing input and avenues are open for programmers to wed touch tablets with an unlimited number of creative and interactive applications.

Conclusions

Before choosing a touch tablet, you must determine what your needs are and then decide which company's tablet has, or is likely to have, the software that will fulfill those needs. Future software releases are impossible to predict; many other software developers could jump into the act.

For business users who prefer a touch tablet to (or in addition to) a mouse, the KoalaPad has advantages over the Chalk Board Powerpad. Its small footprint takes up little desk space and Koala Technologies expresses keen interest in supporting the business market. *PC Design*, however, is available now, lets you easily mix graphics and text, and has bar and pie charts. Furthermore, you can use this product without giving up an expansion slot.

If your orientation is toward design or artistic application, the larger active area and abundant space for tablet menus on the Chalk Board Powerpad could prove attractive. Since the Chalk Board Powerpad comes with Mylar grid overlays, you could easily trace and input existing hard-copy drawings. Still, you may like the buttons on the KoalaPad and its higher resolution might enable greater precision if you intend to use it with high screen resolutions. If you create commercial graphics, the ability to mix text and graphics using *PC Design* could be desirable. Another factor to consider is that the Chalk Board Powerpad and the KoalaPad have different feels, and I would strongly recommend trying both to see which one you find more comfortable.

Anyone looking for an educational tool for their children or classroom may find that the software available for the pad dictates the selection. However, the large menu areas on the Chalk Board Powerpad and its multiple-point input feature could set the stage for some innovative future software for that product.

Both products are solid. Both companies stress that they are not solely producers of touch tablets, rather that they produce touch tablets to strengthen their thrust into various educational or business markets. If other software houses support the touch tablets, the tablets could begin to appear on every desk next to a keyboard. Touch tablets make computer graphics easy to use, educational, affordable, and fun for people who might not otherwise experience the act of drawing with a computer. **—Allen E. Meilach**

VersaWriter Combines Fun and Function

Two species of computer users exist: the video-game fanatic who strives for seven-digit scores in *Pac-Man* and *Space Invaders* and the serious users, like myself, for whom computing is work. No matter how you look at it, the hours I spend over the keyboard weaving words within a text processor, crunching numbers on a soccer-field size spreadsheet, and piecing together lines of code in an esoteric programming language are work, plain and simple. The computer may process letters and digits quicker, but the mind still determines the finished product.

Although I occasionally have been known to indulge in video games, I've usually had my fill of computer "fun" within 5 minutes or so. Or at least that was my outlook before I became acquainted with the *VersaWriter* drawing board.

VersaWriter, originally written for the Apple II, is 5 years old. The device can be classified as a digitizer, graphics, tablet, or picture processor. A digitizer is essentially an electronic pencil that operates much like a joystick or mouse. Move it to the right, the screen cursor moves to the right. Move it left, the screen cursor moves left. The cursor follows the two-dimensional movement of the electronic pencil and leaves an image on the 8½ by 11-inch screen. What you draw on the surface appears on the screen. That's all there is to it.

The possibilities are limited only by your imagination. In addition to freehand sketching, you can fill in colors, paint with a brush of your own design, add text to images, duplicate sections of the screen, create geometric patterns at the touch of a

button, and transfer pictures to disk, to mention only a handful of the more than 50 functions.

When I opened the package from Versa Computing my initial impression was: A digitizer. Hmmm. Now maybe I can convince my Uncle Stanley that I do something worthwhile with my time. With my new drawing board, I could respond to his not-so-tactful inquiries about my employment status by saying, "I do have a real job. Just yesterday I spent 8 hours digitizing." That should hold his tongue for a while.

So even before I plugged it in I had found one use for a digitizer. Actually, I had planned to use the device for tracing maps and construction graphs, the usual cut and dried applications of a drawing board. As I sampled the menu offerings and learned the power of painting by pixels, however, my perception changed radically. Sketch a pattern, smooth the teetered edges, fill it with a myriad of colors. Hey, this is fun. Suddenly I felt like an unguarded 3 year old with a box of crayons and a freshly painted wall.

Why Digitize?

What can the typical PC owner do with such a gizmo? Versa Computing lists a half dozen applications ranging from science to fun. Since I opt for fun over science 99 times out of 100, I'll consider that use first. A long time ago, I learned that nary a nanogram of art talent existed in my 165 pound frame. When I discovered recently that perfect drawings were within my grasp though *VersaWriter*, you can imagine the tremendous desire I had to graphically express myself. I seized a tabloid photograph of Boy George, marched over to the PC, and digitized his countenance. He looked debonair on the monitor; an improvement over the original. Next, I added a portrait of my old college roommate. That looked newsworthy. I inserted a caption—"Boy George Finds New Beau"—beneath the block heading, *The National Enquirer*. What a couple. I printed a copy and sent it to my ex-roommate's girlfriend. From that point on I knew that *VersaWriter* and I were on the road to new heights of pictorial expression.



VersaWriter from Versa Computing.

Versa isn't touting my rendition of Boy George in full-page ads yet, although the company assured me they would keep it on file. Instead, they're apt to cite the engineering, educational, business, and, of course, artistic applications. A graphics tablet is worth its weight in gold to the engineer. Digitize a schematic and you can add, move, or delete lines without spending hours at a drafting table.

With a digitizing electronic servant, designers will be able to forego plastic templates and bottles of white-out to create everything from printed forms to magazine illustrations. Alan Zenreich, a New York-based photographer, employs *VersaWriter* to combine photographs and other graphics for spellbinding visual effects. On a recent assignment for the U.S. Army, Zenreich digitized photographs of a high-school graduate and an M1 tank and adjusted the images to arrive at the most appealing combination of background, and foreground colors. Zenreich describes the process as a "piece of cake" compared to constructing such a combination of photography and imaging without the benefit of a digitizer and PC.

Armed for Drawing

With the whys of digitizing answered, let's turn to the hows of visual communication through *VersaWriter*. *VersaWriter*'s hardware consists of a 13½ by 12-inch drawing board (a quarter-inch plastic tablet) attached to a hinged arm. The arm has shoulder and elbow joints for positioning over any point on the drawing board. Like the human arm, *VersaWriter* can

PC FACTFILE

VersaWriter, Version 2.0
Versa Computing, Inc.
3541 Old Conejo Rd., #104
Newbury Park, CA 91320
(805) 498-1956
List Price: $299
Requires: 128K RAM, one disk drive, PC-DOS, BASICA, color graphics adapter, IBM game control adapter

CIRCLE 724 ON READER SERVICE CARD

reach certain points by rotating the shoulder joint. It can reach other points by rotating the shoulder joint in conjunction with bending the elbow.

A sheet of transparent Mylar that covers the surface of the drawing board anchors illustrations and drawings to facilitate tracing. The end of the arm incorporates a clear plastic lens with cross hairs for exact positioning over dots and lines. A 6-foot ribbon cable leading from the arm tethers the entire drawing board to the PC's standard Game Control Adapter.

VersaWriter determines the position of the end of the drawing board arm or pointer by reading potentiometers (electrical devices that measure an unknown voltage by comparing it to a standard voltage) incorporated in the shoulder and elbow joints of the arm. In this way *VersaWriter* pinpoints the position of the drawing-board pointer by sensing the angles of the arm joints.

Although the drawing hardware interfaces through the PC Game Control Adapter, the software drives it in a special manner to obtain more precision. Normally, the adapter provides a reading ranging from 0 to 255 using the STICK function in BASIC. *VersaWriter* senses a range of 0 to 2048 by reading the adapter in what the user manual calls "a unique way." The net result is higher resolution that, according to the manufacturer, exceeds 30 thousandths of an inch. This resolution covers a useful drawing area of 8½ by 11 inches on the drawing tablet.

Punchy Software

While *VersaWriter*'s arm amounts to a glorified joystick, the software delivers the real punch. *VersaWriter* is delivered on one diskette that can be copied using DOS utilities. The system logically divides into three subsystems written in interpreter BASIC except for two assembler object modules. The DIR command tallies the entire system at about 111K including 64K of BASIC programs in 13 files, 9K of character fonts, two 16K sample pictures, and 6K of assembler modules. Since much of the system is written in BASIC, modification is straightforward, an advantage to the user who would like to tailor the code to more closely fit a given application.

Before you begin computing pictures, *VersaWriter* requires a brief one-time calibration procedure that involves placing the drawing board arm at predesignated positions illustrated on the screen. *VersaWriter* also includes a calibration chart to help align the arm, but the chart conflicts with the screen displays. I followed the screen, which turned out to be correct, and completed the procedure in 3 minutes. *VersaWriter* stores the calibration data in a file that it reads each time the system is invoked.

The system greets you with a digital depiction of President Rutherford B. Hayes pictured on a miniature PC alongside a miniature VersaWriter containing his portrait.

At the onset of every session the system greets you with a digital depiction of President Rutherford B. Hayes. The bearded Hayes is pictured on a miniature PC alongside a miniature *VersaWriter* containing his portrait. Following this novel introduction, you just press any key and you're on your way.

The main menu offers two drawing modes: low resolution X with 128 color patterns and high resolution X with 128 shading/texturing patterns instead of color. Discounting the difference, the drawing modes are essentially the same. The pointer on the drawing board controls direction and the keyboard controls the characteristics of the image.

To sketch a simple pattern, the letter *j* for example, press the F2 key to indicate freehand draw mode. Draw the lower part of the letter by tracing its shape with the pointer on the drawing board. Then press the F1 key to exit draw mode and indicate cursor or positioning mode. Move the cursor to the dot over the *j*. Press F2 again to draw the dot and violà, you're done. Pressing the F1 and F2 keys is analogous to lifting and dropping a pencil while drawing by hand. On conventional paper, you lift the pencil, position, drop the pencil and draw. With *VersaWriter*, you press F1 to lift the pointer from the drawing pad, position the pointer, press F2 to drop the pointer, then draw with the pointer.

The rest of the function keys are dedicated to other common drawing operations. F3 activates point to point mode, in which the current pointer position is the origin of a line. The program will draw a flashing live from this point to whatever position you move the *VersaWriter* pointer to. Pressing the space bar freezes the line on the screen and the last end point becomes the new origin. It's like an electronic tape measure that pulls in any desired direction. And if you're heavy handed and inadvertently create one line too many, pressing the backspace key erases the last line.

VersaWriter Unleashed

The F4 key unleashes *VersaWriter*'s phenomenal airbrush mode. In this mode, the drawing-board pointer is transformed into a paintbrush. The modes of the other keys can complement the airbrush, so instead of sketching points, lines, and curves, you're *painting* points, lines, and curves. Best of all, you define the size, shape, and color of the graphics.

In addition to the 128 color patterns *VersaWriter* offers (or shading patterns in high-resolution mode) you may select a pattern from the screen. Since *VersaWrit-*

er supports two screen images simultaneously (you alternate the images by pressing the Escape key), you can store color patterns on the alternate screen. Display the palette to select a color, then return it to the alternate buffer after you've "dabbed your airbrush."

The shape of the airbrush is constructed from height and width specifications you enter in pixels. Height ranges from 4 to 20 pixels; width from 2 to 10 pixels.

The F7 and F8 keys lock the *X* and *Y* coordinates so you can draw perpendicular lines perfectly and effortlessly. For example, if you want to draw the letter *L*, first press F7 to lock the cursor in a vertical plane. No matter how you move the pointer from side to side, the cusor will slide only vertically. Then press F2 to activate draw mode and draw the vertical bar of the *L* from top to bottom. Press F8, locking the *Y* coordinate; press F7 again, unlocking the *X* coordinate. Move the pointer to the right, and there you have it—a perfect letter *L*.

The software assigns most of the keyboard to sundry operations. The R and T keys recall and transfer pictures to disk. The files are stored in BASIC BLOAD/BSAVE format. Hence pictures can be fed into other graphics packages that follow this convention or massaged by user-written programs. Unfortunately, loading a picture from disk erases the current screen image. There's no way to "layer" or combine different files, a desireable feature found on some more expensive graphics processors.

The B and C keys create box, circle, and polygon figures. When you specify the center and radius, perfect geometric shapes appear before your eyes.

The *G* key specifies the GET function, which allows you to duplicate portions of the screen. You select the portion by surrounding it with a window, then move the cursor to the new area and press the P key to put the duplicate there.

The F key or FILL command paints an enclosed area using the BASICA PAINT statement. One of my first delights with *VersaWriter* was to scribble at random for 30 seconds or so, choose an arbitrary color, then move the cursor around the screen and fill. The color spreads like spilt paint on canvas, but the paint magically stops at the lines encompassing the area.

Four other programs included in *VersaWriter* help roundout the product. The graphics hardcopy subsystem prints pictures on an IBM 80 CPS matrix printer, Epson MX-80 printer, or Epson MX-100 printer. Since the aspect ratio of the printer and screen do not match, the hard copy subsystem adjusts the output slightly producing a 6.7 by 8.5-inch print. A high density mode prints darker pictures of higher dot density.

Unfortunately, loading a picture from disk erases the current screen image. There's no way to "layer" or combine different files, a feature found on some more expensive graphics processors.

The package offers two programs for adding text or labels to images: one for large characters (40 characters per screen line) and one for small characters (80 per screen line). Nine character fonts are included plus a program for designing your own fonts. These programs are reasonably flexible and function as advertised—most of the time. On the version I had, saving an image after adding text required a key sequence that varied with the documentation. Obtaining that important information required a long-distance telephone call to California.

Although many pictures use text only for headings, captions, and the like, it would be nice to have a bare-bones word processor in the label program. As it stands now, you're limited to erasing lines, backspacing over characters, and positioning with the arrow keys. After labeling one or two pictures, you long for word processing functions such as centering text and inserting and deleting embedded characters.

In the area of speed and performance, the software performs satisfactorily. You can exceed its capability to follow a trace by moving the pointer quickly across the drawing board. A dashed, incomplete line results. If you draw at a slower speed, however, say the speed your finger moves while pointing and reading, the software records the line without gaps. Since the program executes under BASICA, memory beyond the 1038K RAM requirement has no effect on performance or the maximum size of drawings. Neither will the 8087 coprocessor improve performance. *VersaWriter* uses fixed point instead of floating point arithmetic.

Down to Brass Tacks

A reviewer must put eventually aside emotional exuberance and ask a few hard questions. Is this product worth the asking price? The answer is a resounding yes. At $299, the *VersaWriter* digitizer is the most important peripheral after the disk drive, printer, and modem if you telecommunicate. The software offers capabilities found in packages costing 10 to 20 times more. Further, the more expensive products often lack freehand drawing, a standard component of *VersaWriter*. Zenreich, the photographer, investigated several digitizing systems before choosing *VersaWriter*. "It's a steal," he says. "Nothing else even comes close."

What functional weaknesses exist? First, the slim documentation (approximately 50 pages) is a terse, indexless reference with few examples that assumes a working knowledge of BASIC. Statements such as "If a 440 Hertz note is

heard, the abort was successful'' underscore its highly technical flavor.

The engineering of the software also rates numerous demerits. The method of selecting options from menu to menu shows little consistency. In the main menu, you type one character to select an option and the program flashes your selection on the screen for 3 seconds. Before performing the action. In other areas, your one character menu selection must be followed by the return key (sans the neon sign effect). Often, in the midst of a series of questions, a wrong answer throws you back to question one and you have to again respond to the whole shebang. For example, in adding text to a picture, you select an input picture file, output file, and up to four font files. After typing in the file names, the program checks for the input file. If the input cannot be found, you're forced to reenter all six file names. Further, if one of the font files is missing, the system exits to BASIC. Such nuisances abound. Based on operator interface alone, the software wouldn't pass Programming 101.

The software method of interrogating the Game Adapter Card may or may not be a problem, depending on your perspective. *VersaWriter* dips into the IBM PC ROM, which works fine on IBM PCs, but PC clones are out of luck. I came across this quirk while attempting to execute the software on a Columbia MVP, portable PC that has a high PC-compatibility batting average.

Despite its shortcomings, I'm still excited about *VersaWriter*. It'll add a new word to your computer vocabulary—digitize. It's better to think of it as a graphics editor, though. It manages images and shapes as text editor manages words and characters.

There was once a time when I put my PC to sleep when the work was finished. Now I slip it another disk and immerse myself in electronic pictures. Although no warnings appear on the product carton, be advised—digitizing can be addictive.

—Edward Joyce

A Three-Dimensional Space Tablet

Input devices for the PC run the gamut from the familiar to the obscure. The hardware landscape is dotted with innumerable keyboards and disk drives, less-common topographical elements like scanners and light pens, and truly rare geological formations like photosensors, fiber optics, and speech recognizers. Now a new and unique input device has appeared on the scene: the three-dimensional digitizer, created by Micro Control Systems of Vernon, Connecticut. Called the Space Tablet, the digitizer is a hardware/software combination that facilitates the on-screen creation of three-dimensional images.

In the interests of unraveling yet another item of computerese, I'll postpone delving into the nuts and bolts of the Space Tablet in favor of a layman's look at three-dimensional digitizing. The arm or pointer of a digitizer senses the physical location of a point in three-dimensional space and transmits this information to the screen using the accompanying software. If the space in question were a box with a balloon floating inside, the pointer would register the height, width, and depth of the balloon's position with respect to the box and then transmit this information to the PC in the form of *x*, *y*, and *z* coordinates. In sum, by sending the PC a series of height, width, and depth readings taken from an object's surface, you can construct a facsimile of the object on the two-dimensional screen in a manner that reflects three-dimensional perspective.

The bottom line is that three-dimensional digitizers electronically capture measurements and relationships that are impractical or impossible to obtain without such a device. Once the computer is given the appropriate spatial data, it can reconstruct an object graphically and change its conformation on the screen. Finding answers to spatial puzzles becomes easy, even for hypothetical questions such as, What would a house look like if the east wall were lengthened, or how would a cup appear with a downsized mug handle attached?

Space Tablet with
Advanced Space Graphics, Version 1.06
Micro Control Systems, Inc.
27 Hartford Turnpike
Vernon, CT 06066
(800) 243-3587, (203) 647-0220
List Price: $1,695
Requires: 128K RAM with PC-DOS 1.1, 192K RAM with PC-DOS 2.1, one disk drive, color/graphics adapter.

CIRCLE 798 ON READER SERVICE CARD

Using the Third Dimension

Graphics in three-dimensional space figure heavily in computer-aided design (CAD), especially computer-aided engineering and computer-aided manufacturing (CAM). Illustrations of schematics, structural analyses, and tool design are CAD/CAM tasks that ordinarily defy effective expression in a two-dimensional plane. Space Tablet introduces the third dimension for these and other applications, even digitizing teeth and human skulls.

The three-dimensional Space Tablet

won't rank at the top of the average PC owner's wishlist. On the contrary, its $1,695 price tag and its sophistication will probably relegate it to high-technology environments in industry or the classroom. Yet for those who live and breathe in the three-dimensional world, there is no other tool like it (see "Computing in 3-D," *PC*, Volume 2 Number 1).

Dr. Frank Clarke stepped into the world of three-dimensional digitizing in pursuit of new drugs for treating cardiovascular and central nervous system disorders. A chemist with the pharmaceutical firm Ciba-Geigy, he builds molecular models using angstrom coordinates. Traditionally, these models were constructed on large, "hundred-thousand dollar plus" computers or with tedious, ball-and-stick models that are physically cumbersome and simply impractical for complicated molecules. Though Clarke still relies on these in part, he is shifting much of the work to a PC/Space Tablet system.

The PC shows its particular advantages when Clarke is comparing and combining molecules. Digital images of two molecules can be precisely compared by superimposing one over the other on the display screen. Similarly, new molecules can be created with the Space Tablet software by combining existing models. "Having this type of flexibility and capability on a personal computer is a godsend," says Clarke, summarizing his experience.

What is Dr. Clarke talking about? Is the Space Tablet comparable to a sci-fi chalk and blackboard or a screen-based erector set? The system reviewed here consists of a tablet with a robot-type arm, a high-resolution interface card, and *Advanced Space Graphics* software. The tablet is a sheet of metal measuring 16 X 13.5 X 0.4 inches with a pivoting arm attached on one end. The arm has four joints of rotation that allow it to sweep an area larger than the sphere of a basketball. Potentiometers housed in each of the four joints relay the angles of the arm segments through a 36-inch ribbon cable to the PC, which then calculates the *x*, *y*, and *z* coordinates of the arm tip and plots the point on the processor screen.

The PC receives the angle data through the high-resolution interface card designed especially for the Space Tablet. The interface card samples four points per second and yields an accuracy of one mm (.04 inch), according to the manufacturer.

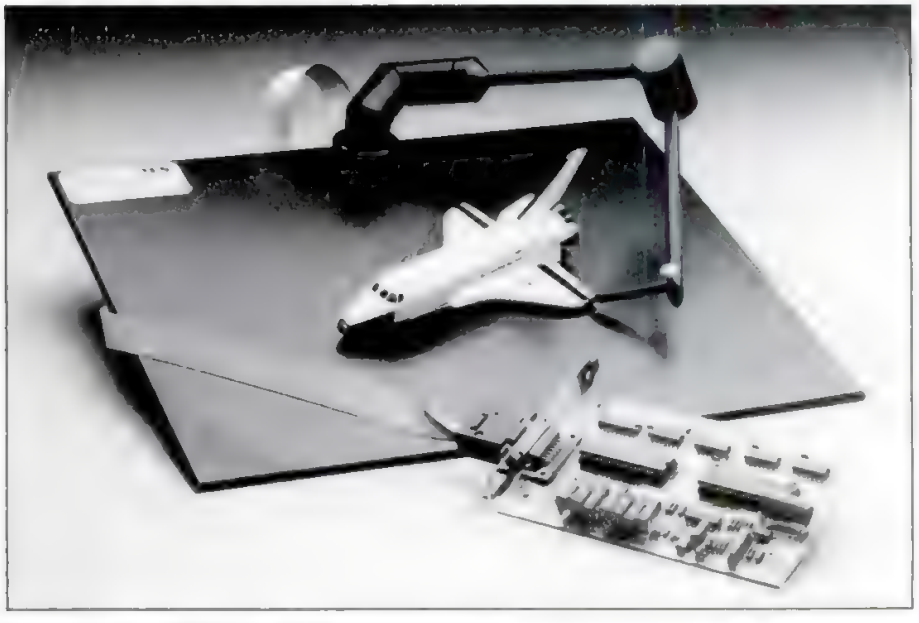
Like most systems that incorporate potentiometers, the Space Tablet requires an initial calibration procedure. The procedure takes about an hour, but once completed you need only recalibrate if, in the words of the user's manual, you start getting "funny" results.

The Space Tablet is a hardware/software combination that facilitates the on-screen creation of three-dimensional images.

In most robust digitizing systems, the complexity of the software equals the complexity of the hardware raised to the tenth power. So too with the Space Tablet. An exploded chart of the menus lists 117 functions nested as far as six layers deep.

The software is distributed on three diskettes with a total of 312K of assembler programs. The largest program barely fits in a 128K system with PC-DOS 1.1. The close tolerance presented a problem when I tried to execute the system on a PC-compatible machine running MS-DOS 1.25. Version 1.25 hoards a tad more memory than version 1.1. Some Space Tablet programs wouldn't fit. Of course, Micro Control Systems admits the snugness of the software on 128K. In the environment of the larger MS-DOS 2.1, it stipulates 192K of main memory.

The software represents an image through a combination of up to 2,000 points and 2,500 lines. Floating-point math is used to map the image, which results in a higher resolution than pixel-based graphics since these are limited by the pixel matrix of the monitor. Presently, the software uses only 128K of memory (192K on DOS 2.1) and performs calculations without relying on the 8087 math



The Space Tablet from Micro Control Systems.

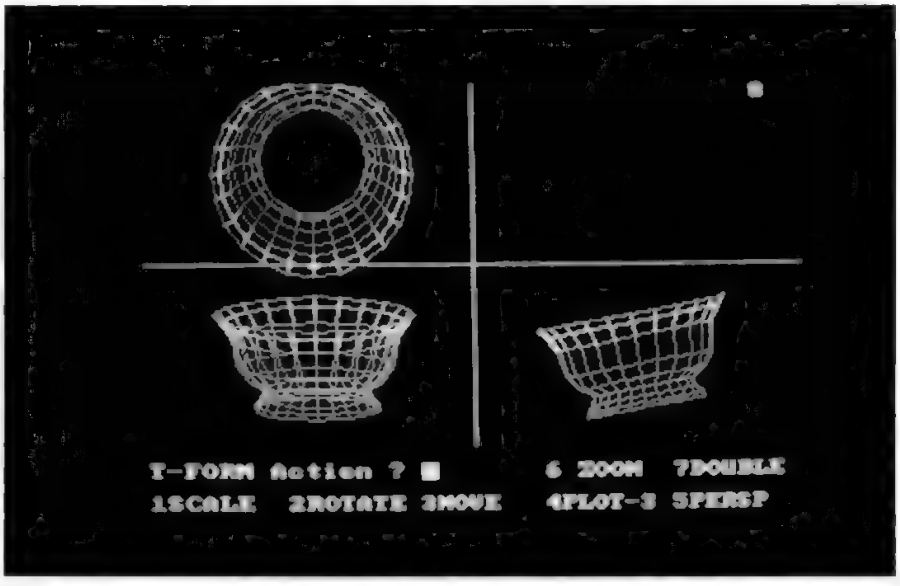
coprocessor. Although extra memory and 8087 options are now absent, the next version will take advantage of them.

When the *Advanced Space Graphics* system is invoked, five main functions are presented: Input, Output, Transformations, File Management, and Labeling. The first function handles the input of coordinate data from the Space Tablet. The digital image of an object is obtained by moving the end of the arm or pointer across the object following an imaginary grid. Digitizing point to point on the grid in this manner creates a "wire-frame" representation of the object. As the image is being created, three simultaneous views are displayed on the screen: front, top, and side.

Within the Input menu is a plethora of parameters, switches, and options that facilitate the task of digitizing. Grid snap can be activated to "snap" the pointer to the nearest grid point, which allows a degree of error when entering data points. The scale of the grid is under full control of the operator, and the *x*, *y*, and *z* axes can be locked, which also helps maintain the accuracy of the trace. Locking the *z* axis, for example, keeps that coordinate constant regardless of the motion of the pointer. Without grid snap and axis locking, operating a precision instrument such as the Space Tablet, which senses motion with an accuracy of one millimeter, can be nerve wracking. Shooting pictures with a hand-held 35-mm camera set for half-second shutter speeds would probably be an easier chore.



A designer uses the Space Tablet to interactively digitize a pewter bowl. The symmetry functions of *Advanced Space Graphics* allow him to complete the process in less than 5 minutes.



The completed bowl can be viewed from any angle, including three simultaneous orthonormal views (top, front, and side). The image can be rotated, scaled, moved, and stored on disk for use as a component in a more complex drawing.

The polygon feature further simplifies the digitizing process by creating connected polygons or circles about an axis of radial symmetry. The function is designed for rapid generation of three-dimensional surfaces of revolution and works well for digitizing bottles, cans, cups, and similarly shaped objects.

> You need only recalibrate if, in the words of the user's manual, you start getting "funny" results.

The Output function prints screen images on a printer or plotter. The system drives five different printers, including the Epson MX-80 and MX-100, the Hewlett-Packard 7470A, the IBM XY/750, and the Houston Instruments DMP-40.

The Space Tablet is not only convenient but also fun, especially when you drop into the Transformations menu. Before your very eyes, images can be rotated, scaled up, and scaled down. I actually took a full-screen model of the Space Shuttle, shrank it down to a dot—that's right, one pixel—and then zoomed it back up to its original size. During the transformations, the machine responds quickly, within a second, and compound curves actually bend in three-dimensional space, a feature not found on two-and-one-half-dimensional systems.

The Space Tablet system's File Management functions give you the opportunity to save, load, and edit picture files. Pictures can be "layered" with the LOAD command. For example, distinct architectural pictures of two separate houses can be layered and combined to form a single



The shaft of the pulley's image is "active" and can be manipulated on screen.

architectural rendering of a duplex.

The Edit function allows you to touch up drawings by adding, deleting, and changing points and lines. It is fairly flexible, but I did long for an airbrush-style erase mechanism, which the system lacked.

The beauty of the Label function, which inserts text and dimensions in drawings, is its ability to calculate distances *and angles* between points, and then label the drawing with that information. I have to applaud this function. With it, putting together the do-it-yourself blueprints that fill the pages of *Mechanix Illustrated* would be a breeze.

Documentation

In most respects, the Space Tablet's documentation earns above-average marks. The IBM-sized, color-coordinated, three-ring binder contains 125 typeset pages of clear, comprehensive explanations. The manual still leaves room for significant improvement, though. An illustrated, spoon-fed tutorial demonstrating the best way to digitize a common object, such as a cup, would streamline the introduction to the system. The present documentation confronts you with the entire system, all 117 functions. Assimilating the information is like trying to eat a melting ice cream cone: You have to lick everywhere at once.

One quirk in the manual that I couldn't figure out was the placement of the critical calibration procedure at the end of Chapter 12. Calibrating the hardware is virtually the first thing to be done after plugging the Space Tablet in. Slipping the procedure into the back of the book contravenes the first commandment of writing a user's manual: "What should be done first, goes first."

At first glance, the Space Tablet resembles a souped-up joystick, but there the resemblance ends. The mechanism is a high-tech, precision instrument, with a steep learning curve to match. I discovered this in short order after unpacking the system. The glossy brochure with the attractive images of the Space Shuttle fired up my enthusiasm, so I tossed the user's manual aside, placed a coffee cup on the Space Tablet and decided to teach myself three-dimensional digitizing through old-fashioned, hands-on experience.

About 3 hours later I finished digitizing one coffee cup. It looked like a fission-fried prop from the movie *The Day After*. I rotated it, scaled it up and down, added lines, deleted lines—it only looked worse, till finally I erased it altogether.

The moral of the story is that efficient digitizing in three dimensions requires a certain flair and dedication that comes only with practice. After I followed the recommendations in the manual and chatted briefly with the folks at Micro Control Systems (who incidentally provide excellent telephone support), my digitizing improved. I cut the time by an order of magnitude, and the finished product appeared to be more than abstract art.

Micro Control Systems' three-dimensional digitizer is both blessed and cursed by its status as a one-of-a-kind product. On the one hand, the manufacturer can claim that it has no competition in the marketplace. On the other hand, a massive education job confronts the pioneering entrepreneur. After all, *digitizer*, let alone *three-dimensional digitizer*, doesn't exactly qualify as the proverbial household word.

Assimilating the information in the manual is like trying to eat a melting ice cream cone: You have to lick everywhere at once.

The Space Tablet won't win a prize as the cheapest PC peripheral. For those who would like to sample the water before jumping in, Micro Control Systems does offer a stripped-down version. A $795 investment brings a system designed for educational institutions consisting of the Space Tablet and a subset of the full-blown software. Meanwhile, certain problems continually surface that cannot be squashed, stretched, or twisted onto two dimensions. When you're up against those rascals in the heat of the battle, $1,695 for a three-dimensional digitizer is money well spent. **—Edward Joyce**

PENPAD Reads the Writing on the Tablet

Many years ago, when I was still an art student, I attended a commercial exposition where would-be entrepreneurs promoted everything from miracle floor waxes to artificial fishing lures. One booth offered an irresistible opportunity: For half a buck I could have my handwriting analyzed by a computer. For my 50 cents, I was handed a punch card on which I signed my name. The gent operating the booth inserted my card into a sorter attached to a large bank of blinking lights. The machine spit out a card with a crude bar graph and text evaluating seven or eight critical character traits. My two lowest scores were for creativity and manual dexterity, not an encouraging evaluation for a young artist.

This was more than a decade before the first microcomputer appeared on the market. At the time, computers were still thought of as magical devices controlled by a privileged few. Years later I realized that there probably hadn't even been a computer in the booth! The Wizard of Oz character in charge of it kept up a running patter, the sorter whirred, the lights blinked impressively, and then, in all likelihood, a random card was chosen for my evaluation. Even if there had been a computer in the booth, I doubt that the machines of the time could have managed handwriting analysis. Today, with the latest developments in hardware and software technology, I'm not so sure it couldn't be done. After all, Pencept Inc. has just introduced a microcomputer graphics tablet that can read the characters you write on it.

PENPAD Model 320
Pencept Inc.
39 Green St.
Waltham, MA 02154
(617) 893-6390
List Price: $995
Requires: 128K RAM, empty full-length options slot.

CIRCLE 795 ON READER SERVICE CARD

Micro Graphics Tablets

Graphics tablet companies have discovered the micro market. Ads from companies such as Houston Instruments, GTCO, Hitachi, Summagraphics, and Micro Control Systems are turning up with more frequency in the micro magazines. Each company offers its own version of a tablet that can interface with popular microcomputer systems. All do pretty much the same thing (except for MCS's entry, which can digitize in the third dimension). The products differ chiefly from one another in the type and amount of software support they provide.

The PENPAD Model 320 from Pencept Inc. is a graphics tablet and interface designed specifically for the IBM PC. It does what all the others do, but what sets it apart from its competition is its extraordinary ability to read hand-printed alphanumeric text. If you print a capital *A* on the pad, it will be immediately inserted into the keyboard buffer and echoed on the screen. This makes it possible for you to communicate with your personal computer and popular applications software packages using handwritten entries, totally bypassing the keyboard. The question becomes: Is this just a gimmick, or is there something profound going on here? To find out, PENPAD must be considered in its entirety. You need to understand the general workings of graphics tablets before PENPAD's character-recognition capabilities can be put into perspective.

Graphics tablets are still not cheap. PENPAD will cost you close to $1,000. It will also cost you an expansion slot. Most graphics tablets communicate with the computer through the serial or parallel port, and an earlier version of PENPAD did communicate through ports. That version was housed in a self-contained, fan-cooled box with its own power supply, but what used to be in that box has now been stuffed onto a card that goes inside the PC. My system now runs hotter and an auxiliary fan might be in order for those who plan to use PENPAD for extended periods.

PENPAD's interface card is crammed with chips. The brains of the operation is a Motorola 68000. The card also carries 64K of its own dedicated RAM, which is not available to the PC, and two rows of PROM chips (192K in all) containing the code for processing the incoming tablet information and interpreting the handwritten characters. The old, self-contained system had red lights and a beeper to indicate interface status. The lights are gone but the beeper remains, communicating by beeping codes during calibration procedures or when reporting read errors.

PENPAD measures about 17 inches square and is half an inch thick. It has four rubber feet raising it slightly off the surface of the desk. A smaller, 11-inch square area in the center of the pad is the active surface. A raised straight edge carrying the PENCEPT logo runs across the top of this area, connecting with a second raised edge running down the left margin. This edge creates a 90-degree angle guide for aligning templates and worksheets. Horizontal strips of replaceable double-

sided tape hold the template and worksheets in place. Registration and stability are extremely important to the character recognition software and a padded rest for the hand and forearm runs across the bottom of the tablet, reflecting the thoughtful design of its work surface. Sandwiched inside the tablet are the network of wires and the electronics necessary to read and transmit the position of the stylus.

The tablet takes up a lot of desk space. When it is not being used, stuff tends to collect on it because available desk space is usually limited. I have been told that diskettes are in no danger when left on the tablet surface, but I still advise caution.

Pencept's black drawing stylus completes the system hardware. It looks like an old-fashioned ballpoint pen. In fact, the tip of the stylus is a ballpoint pen that writes in blue ink. The tip also acts as an electronic switch. The barrel of the stylus contains a push button that functions as a second output switch. A wire extends from the top of the stylus to a connector at the back of the tablet.

During normal operation, the *X-Y* coordinates of the stylus and the status of its two switches are continually updated. The tablet has a proximity sensitivity feature that reads the presence of the stylus when it gets to within half an inch of the surface. This feature registers *X-Y* coordinates of the stylus tip even when it's not touching the tablet, so that it is possible to move a cursor or cross hairs around the screen or to simulate the action of a mouse.

Getting PENPAD up and running is easy. You begin by running the PENPAD initialization program, which links the internal card and software into DOS so that the computer knows that the board is there. The initializing program should be added to your boot disk and included in the AUTOEXEC file startup sequence along with your RAMdisk setup or whatever else you do when starting your system. When the initializing program has been run, the PC beeps, signifying that the template over the command area needs to be calibrated. You touch the stylus point to the small, cross-haired circles on the upper-left, lower-left, and lower-right hand corners of the template. The PENPAD beeper sounds as each point is read into the computer. If a reading error occurs, three quick beeps tell you to begin the calibration sequence again.



The PENPAD Model 320 from Pencept.

Templates

Entering commands is even easier than calibrating the system. The surface of the tablet is divided into two general areas. The control area, where the commands are entered, is at the top of the board. The lower part is the work area.

Special templates have been designed for use with different applications software. The templates are rectangular plastic overlays which sit across the top of the work area. The names of the commands are printed in boxes on the template.

Templates seem to offer a number of advantages, as you can see when you compare this command entry system with that of the keyboard. Keyboard keys are positioned in a fixed arrangement. They have been assigned meanings and are labeled as such. Keystrokes can be combined to create additional commands, for example the Ctrl-Num Lock key combination suspends action while Ctrl-Alt-Del performs a soft boot.

Unfortunately, important commands are often entered using totally different keys under different applications. Key labels can help you remember which key does what, but key combinations pose problems. Where do the labels go and what do they say then? And do you change labels when you change applications?

One solution to this problem is to use screen display space for key assignments and control code meanings. If a mouse is used, these screen menu options must be included. The problem is that screen display space is limited and could more profitably be used for display, not menus.

On a template, the command names are printed out, in full, in the appropriate command boxes. The command boxes are grouped together according to function. A whole sequence of keystrokes can be given one meaningful name, assigned to one command box, and executed with a single touch of the stylus. Changing application programs also changes templates. Each new application has a new set of commands. Of course, you must reinitialize the interface card by booting the appropriate interface utility, so that the card knows

the position and meaning of the command boxes on the new template.

The command template for the IBM PC matches the functions of the keyboard command keys. It provides a clustered box group for the ten function keys and the Ctrl, Shift, and Alt keys, and a second cluster for the cursor control keys, Ins, and Del. A third group of boxes covers the Tab, Back Tab, Pause, and Break functions and the Backspace, Esc, and Return keys. Another box in that cluster is labeled Control Character. It has a place to write the control letter to be entered. Below that is an area with a strip of ten cells called the Scratch Pad, where words or commands of up to ten characters can be entered. The final cluster on the template contains commands meant for PENPAD itself. One half of this cluster contains boxes labeled Uppercase, Lowercase, Numeric, and All. Boxes in the other half carry labels such as Calibrate Form, Calibrate Command, and 24-by-42 or 24-by-50.

Once the template has been calibrated, any command that can be entered by pushing keys on the keyboard can also be entered from PENPAD. For example, if you are in DOS, and you want to see the directory, you simply touch the Uppercase box, print DIR in the scratch pad area and touch the Return box. If you want to freeze the listing, touch the Pause box. Touch any other box to continue the listing.

Character Recognition

PENPAD is a fine graphics tablet on any terms, but it's time to take a look at what makes it special. Character recognition is PENPAD's claim to fame. To use this revolutionary feature, complete the template calibration sequence and position a worksheet over the work area, directly below the template. The worksheet contains rows and columns of letter boxes that are used for entering written text. In order for the box boundary lines to be meaningful to the character recognition software, each newly placed worksheet must be calibrated. First, touch the Calibrate Form box on the template. A beep means the calibration process is ready. Place the stylus on the circled cross hairs in the upper-left corner of the form. Wait for another beep. Touch the lower-left and lower-right corners for two more beeps. Finally, touch the appropriate dimensions for the worksheet you are using so that PENPAD knows the number of horizontal boxes. The worksheet is now calibrated and can be written on.

Touch the Uppercase box and start printing. You will be amazed when you start entering text. A letter or word printed on the worksheet will immediately appear on the screen. The software for interpreting the printed letters is extremely sophisticated and can recognize a wide range of handwriting styles. A light touch causes the least confusion. It does take some getting used to.

Any command that can be entered by pushing keys on the keyboard can also be entered from PENPAD.

When people start working with PENPAD, they immediately begin testing its intelligence. How far from the norm can a letter deviate before the interpreter makes an error? Pretty far.

PENPAD recognizes the entire set of uppercase alpha characters. To print lower-case, select that option on the template and continue to print on the worksheet in uppercase. The letters will appear in lowercase on the screen. The program recognizes digits *0* through *9* and all punctuation marks too. Characters that can be confused demand that you pay particular attention to details: crossbars on the top and bottom of the letter *I* are necessary to differentiate it from a *1*, and a diagonal stroke is required on the *0*. To indicate a left parenthesis, extend it beyond the top and bottom of the letter box, otherwise it will be read as the letter *C*. Be careful with the number *2* and the letter *Z*. A blank space is represented by an upside-down U. Generally, however, PENPAD is forgiving and will understand you the first time. Mistakes can often be corrected by printing over the misunderstood letter.

The people who developed these algorithms deserve congratulations. Designing general purpose software for the recognition of handwritten characters is in the same league as voice input and the interpretation of speech—extremely difficult and filled with exceptions.

How does it work? To begin with, the angle of the pen is significant and is tested during the calibration sequence. The instructions warn you to be careful to hold the pen at the same angle when calibrating that you use when writing to the tablet. When forming the letters, the direction and number of your strokes are of primary importance in defining the character. Sequence and speed are important too. But PENPAD goes beyond these obvious elements into areas having to do with filters and tables and other things you don't have to know or care about.

Many of PENPAD's features are software dependent. For instance, entries on the forms worksheet may or may not be positionally significant. While individual characters can be recognized and accepted by PENPAD, the place the character is written on the worksheet might not coincide with where it appears on the screen, depending on the program.

BASIC Interfaces

What do you use the character recognition ability for? Many programmers are looking to buy graphics tablets for specific applications that require integrating the tablet with their programs. Often these applications include text entry.

To use PENPAD with BASIC programs, you must install special drivers consisting of two machine code subroutines for input and output. Your program first loads these into high memory using

the PENDRV.BAS subroutine in BASIC. BASIC CALLs are then used to send instructions to and from the tablet. The applications program must provide code to set up this communication.

I tried PAGEDEMO.BAS, a demonstration program that showed how text input could be captured from the tablet. In this case, the worksheet measured 42 by 24 characters, and a segment of the screen was defined according to those proportions. This program did little more than verify that text printed on the tablet could communicate to the PC from within a BASIC program.

I also tried a graphics drawing program called PCDOODLE. A short program written in compiled BASIC, PCDOODLE was designed to be used with the 16-color Plantronics graphics card and to show off the tablet's graphics capabilities. Installation of both cards and the tablet took just 5 minutes. When I booted PCDOODLE, it came up right away.

Creating drawings with PCDOODLE was just plain fun. The speed of the drawing mode tended to be sluggish, a little like drawing with molasses—probably because the program was written in BASIC and because of the constant plane-switching needed to generate the 16 colors on the Plantronics board. PCDOODLE demonstrated that the tablet is accurate and precise when used as a straightforward graphics input device.

PCDOODLE also demonstrates an interesting implementation of the PENPAD system's special intelligence. PCDOODLE lets a user create oversized text in any color with remarkable ease. In the normal text mode, it is possible to print letters of text and have them displayed on the screen. This ability is bread and butter for PENPAD, which generally depends on standard placement of the letters, one to a box, on the graph-grid worksheet. But the Big Title mode ignores the boxes. Instead, you can print the letters any size or shape: long and narrow, short and fat, very large or very small. The resulting letters appear on screen, positioned as they were drawn, matching the scale and proportion of the letter on the tablet. The grid-bound scale limitations are ignored. The drawing program then records the dimensions of the letter and determines vertical and horizontal multipliers by dividing the height and width of the drawn letter by eight. Finally, each pixel in the normal letter is scaled by the multipliers and displayed on the screen in the appropriate position, resulting in a big, blocky screen version of the hand-drawn letter. Bravo.

Applications Interfaces

Applications Interfaces are one of Pencept's most interesting ideas. Here is where, theoretically, both templates and character recognition is most useful. My review model came with two, one for Lotus' *1-2-3* and the other for the IBM Personal Editor. An Applications Interface consists of a specially designed driver program and a command template. The interface program must be installed and the appropriate template positioned and calibrated before you can use the application.

For example, with *1-2-3*, all of the normal keyboard commands can be issued by touching command boxes on the template.

The worksheet on the tablet is limited to a constant surface of 42 boxes across by 24 lines down.

Cell entries can be made on the worksheet, and cursor movements can be executed in the Mouse mode, by holding the PENPAD's button down and moving the pen tip across the pad, slightly above the surface. This action scrolls the reverse video cursor from box to box just the way a mouse would. By selecting the numeric character set, you can enter numerals, decimal points, and sign information. An @ sign command box lets you enter formulas. Pencept is designing templates and interfaces for *WordStar*, *dBASE II*, and other applications software.

In spite of the potential advantages of this system, I had mixed reactions to the *1-2-3* interface. The Pencept promotional literature emphasizes the friendliness and the ease-of-use of the interfaces, but I found using this one far more difficult than using the keyboard. The templates were on the tablet, so I had to look away from the screen to enter commands or data. When using the keyboard, my eyes almost never leave the screen. (Of course, the situation would be reversed for a nontypist who took the time to become familiar with the template.) Another problem was that even though the spreadsheet expands beyond the screen window, the worksheet on the tablet is limited to a constant surface of 42 boxes across by 24 lines down. The PENPAD worksheet quickly fills with overwritten numbers, labels, and formulas, so that you can't see what you've written. And, let's face it, most people can type much faster than they can print. Graphics pads and templates may be a good idea for working with applications like computer-aided design and graphics, but they're probably a bad idea for spreadsheets and word processors.

Another feature of PENPAD, which is typical of the new generation of graphics tablets, is programmability. Information can travel in both directions and the tablet can be sent commands just like smart printers and modems can. The user can set the resolution, mode, and sampling rate to precisely suit the application. Resolution on a tablet can be set as high as 500 lines per inch, allowing a high degree of precision in input. The sampling rate can run as high as 100 coordinate pairs per second.

The PENPAD system is more than just a gimmick. It is a unique input device. Inevitably, new software will be written to take advantage of its ability to read hand-printed input. In a society where filling in forms is a way of life, PENPAD has a great future.—**John Schnell**

The Line on Bar Code Readers

Bar codes are more than just familiar symbols to supermarket shoppers. Today bar code scanners are teaming up with PCs to provide low-cost, high-accuracy data input for many applications.



Bar Code Readers for the IBM PC

The bar code has become a ubiquitous and familiar symbol to the supermarket shopper. But supermarkets aren't the only places you can find bar codes these days. Other retailers as well as managers are discovering that bar codes can team up with personal computers for low-cost, high-accuracy data input. Bar code equipment manufacturers are responding with an arsenal of products.

Vertical bar patterns debuted on supermarket shelves soon after the adoption of the Universal Product Code (UPC) symbol set in 1973. The first supermarket scanner, installed 10 years ago, was added to a computer-driven cash register at Marsh's supermarket in Troy, Ohio.

Stores like Marsh's planned to reduce costs by deleting price tags on individual items. Cashiers would retrieve prices with a wand or scanner at checkout time from a mainframe lookup table triggered by the UPC identification. After consumers revolted against this threat to their main means of comparison shopping, prices reappeared on the shelves and on most items, and store managers adopted a go-slow policy on installing scanners.

Personal computers are now bringing the benefits of bar code technology back to life. They combine the flexibility of local data processing with cost-effective communications. In standalone mode, a PC with a bar code reader can manage the library of a videotape rental service, for example. In the on-line transaction mode, a retail salesperson can perform a credit verification automatically through mainframe communications while registering the customer's purchases; meanwhile, the PC can calculate stock balances.

Reports of creative applications

Photographs: Les Morsillo


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abound. Retail and point of sale systems are bringing big-league benefits to small-business owners. Managers get accurate, detailed reports of operations at any time as a byproduct of the checkout process. Laser scanners track and direct the progress of shipping containers on a conveyor belt. The airbills of overnight small-package express companies and international courier services now include bar codes used for tracking, routing, and delivering critical items and documents.

Putting bar codes to work successfully is becoming easier each day. The number of manufacturers listed in the industry's major trade directory doubled to 140 from 1982 to 1983 and is expected to double again in the new edition (to be published July 1984). Potential users will find that the variety of available models provides a match for almost any specific requirement. Application examples are detailed in trade publications and newsletters (see sidebar, "Read All About It"). Several professional societies have subgroups that specialize in gathering and distributing information on bar code use in specific industries.

In addition to the commercial and industrial data input processes that can benefit from using bar codes, it's handy to have one of the magic wands and a bar-coded menu card around the PC keyboard for general use. Some wands input data to the PC by simulating keystrokes; the PC is virtually always ready to accept input from the wand, regardless of what program you're running. Computer users with less-than-excellent typing skills should joyfully welcome an opportunity to input DOS commands with a flick of the wrist. Someday, astute software manufacturers may even provide bar-coded reference cards to help consumers learn and use their programs.

You can put the graphics capabilities of most dot matrix printers to use to generate custom bar code labels for products and documents. Several bar code reader manufacturers market software for generating labels in a wide variety of sizes and formats using a PC and a dot matrix printer. Some of these programs have auto-incrementing data fields for printing labels with sequential product serial numbers.

Symbologies Simplified

Although designing a simple bar code system is easy, at least a passing acquaintance with the fundamentals is advisable. Knowing the basics is also useful for describing a more complex application to a system analysts who can create an effective solution.

A good place to start is with symbologies, systems of encoding and decoding bar patterns. The Universal Product Code used on grocery items, records, paperback books, and magazines is the most widely known symbology. UPC normally contains ten characters that can represent only numeric digits. The first five digits represent the supplier and the last five identify the item number. *PC*, *PC Tech Journal*, and *PCjr*. magazines, for example, can be identified as related publications because the UPC bar codes on all three start with the digits 14024. Two- and five-digit supplements can now be added at the end of UPC codes to provide further information. The European Article Number code is identical to UPC except that additional characters have been added to identify the country.

Hand-held laser scanners, a relatively new development, are even more convenient than conventional wands for data input.

The CODE 39 symbology is an alphanumeric code; its characters can represent numbers or letters. This code also provides special characters. CODE 39 bars can be variable in length and can be read from either direction. It is used by the U.S. Defense Department, the auto industry, and for the coding of shipping containers. Its generic name is "code 3-of-9," referring to the fact that each character is represented by nine elements (consisting of five bars and four spaces) and that three of the nine elements are always wide. CODE 39 is a registered trademark of Intermec Corporation, but the symbology is in the public domain.

In the Interleaved 2 of 5 symbology, each character is represented by five bars or five spaces, and two of the five elements are wide. Any pattern of bars and spaces "interleaves" two characters, so an even number of digits must be used.

The CODABAR symbology contains numbers and special characters and is used by a small package express service, the Library of Congress, and on medical blood bags and photofinishing bags.

The bar codes you produce with the symbology you choose can be read with pen scanners and laser scanners. Pen scanners, frequently called wands, are normally moved horizontally by hand from one end of the code to the other, with the wand tip contacting the surface on which the bar pattern is printed. Wands come in both visible and infrared models. Laser scanners read bar codes at a distance. They are normally used in supermarket checkout stations and for reading codes of items moving on assembly lines. Hand-held laser scanners, a relatively new development, are even more convenient than conventional wands for data input.

For use with PCs, scanners are connected to a small terminal unit that contains a microprocessor. The terminal unit amplifies the scanner signals, decodes the light pattern into characters according to the defined symbology, and then outputs the characters. The output signals for most units are either in the form of keyboard scan codes to simulate the PC keyboard or else in serial RS-232 format so that a standard asynchronous communications port

Photographs: Les Morsillo

can process them.

The terminal units typically contain 8-bit microprocessors, such as the 6802 and the 8085, that use ROM- or PROM-stored programs. Some units include nonvolatile, programmable memory so that setup parameters such as output baud rate will remain at the set values even if you turn the power off. Units programmed for autodiscrimination can automatically determine which of a group of symbologies is being read. Most symbologies and readers include reliable error-checking schemes to assure that only correctly read codes are recognized.

A large field of manufacturers is producing an amazing variety of bar code readers and related items for automating PC input. Read on for descriptions of some representative products. ■

The CYC-IB from New Wave Systems

The CYC-IB IBM PC keyboard in-line bar code reader, New Wave Systems' newest offering, sports one of the smallest external packages around. It connects in series with the PC keyboard and requires no separate power supply. To install the unit, you connect the PC's keyboard cable to the reader/decoder unit and another cable connects the unit to the keyboard DIN connector on the back of the PC. A Hewlett-Packard wand handles input. A red LED indicator and audible beeper confirm that a bar code has been read successfully. The LED, normally on, goes out while a code is being scanned.

The CYC-IB simulates keyboard strokes and receives characters in standard ASCII format. It generates a carriage return to indicate to the PC that it has transmitted all characters of a scanned code. Input programming is easy using the BASIC input statements. In my tests, New Wave System's unit read codes accurately, both on test cards and labels the manufacturer provided with the unit and on bar code labels I generated on an Epson printer using the separately priced *BarGen* program.

BarGen is a program that prints UPC and CODE 39 bar codes on MX, FX, and RX series and compatible printers. Human readable interpretations of the code characters and up to nine lines of text may be printed on *BarGen* labels. You can enter data from the keyboard or from a diskette file and generate sequentially numbered labels automatically. The CYC-IB easily reads labels generated by the sample data file program supplied with *BarGen*.

New Wave Systems also makes an RS-232-interface reader/decoder unit that interfaces with data terminals or PCs at 300 to 9600 baud. Operation from the user's standpoint is the same as the CYC-IB once the selectable communications parameters are set with hardware switches.



The CYC-IB bar code reader from New Wave Systems, including a Hewlett-Packard wand.

Movie Star News

In 1931 he was a "B" Western bad guy.

In 1932 he was the king of Hollywood.

He was Gable. Every woman's heart-throb. Every man's secret envy. An overnight sensation who rocketed to the top. And stayed there.

Multimate International. We started out as seven programmers and one tough assignment. To create a word processor that would give the IBM PC the power, speed and functionality of a Wang dedicated word processor.

We did it. And Multimate was an immediate hit. Now, it's the fastest rising star in office automation. The centerpiece of a growing line of products that are expanding the very concept of word processing. And a support organization that stands ready to help every user over any rough spot.

Multimate International. In our first few months, our fans helped us become a multimillion dollar superstar. And we intend to keep it that way.

To find out more about Multimate, the word processor, and Multimate International, the company, call Jordan Caswell at 1-800-243-3142.

Multimate

We're putting our reputation into words.

TPS Electronics' PC-300

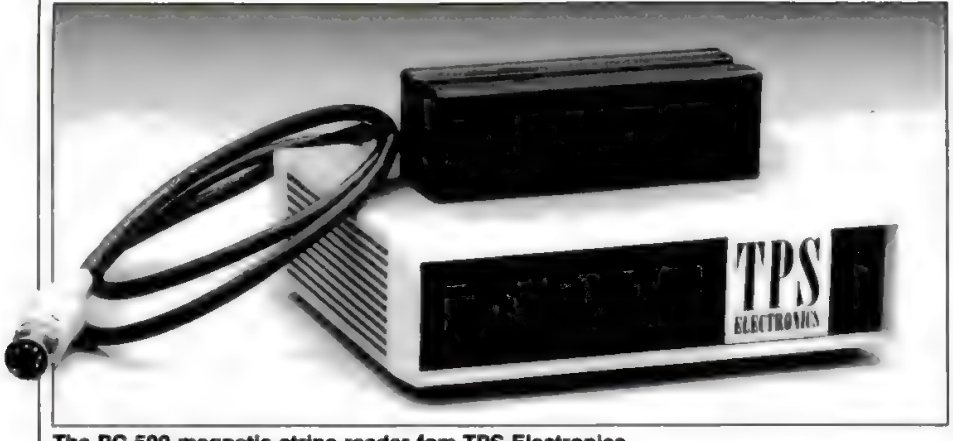
TPS Electronics manufactures data input devices for use with the IBM PC, the DEC Rainbow, and other personal computers. The PC-300, TPS' bar code reader/decoder model, includes a wand and output cable. Both are permanently attached, which avoids the possibility of loss but at the same time means that the entire unit will be out of action if the wand portion requires service. The PC's keyboard connector plugs into the rear of the PC-300.

When a patron checks out a book, his record is checked by the bar-code reader.

The PC-300, a low-profile unit measuring 6 inches by 5 inches by 1¾ inches, is enclosed in a heavy-duty, extruded aluminum case. CODABAR and CODE 39 symbologies are standard, with other symbologies available. The wand is mounted on a 6-foot, coiled cord, and the 1 watt of power it requires is derived from the PC's keyboard cable. In operation, the TPS unit confirms a successful reading with a quiet audible beep. It can read bar codes by scanning from either end.

TPS documentation provides an example application of the use of bar codes in libraries. Bar code labels are attached to patrons' library cards and to cataloged books. When initially assigned, the patron and book information is entered by keyboard along with the assigned bar code. When a patron checks out a book, the librarian scans his card and his record is automatically checked. Then the wand reads the book bar codes and the computer enters the corresponding titles into the patron's record. The wand reads the book codes again when the patron returns the books, and the corresponding book entries are cleared from the record. Library programs can also generate past due notices.

Other TPS products include the PC-500, a magnetic stripe reader that inputs data from the magnetic tape stripe on the back of credit and authorization cards; and the PC-3000, a combination unit that includes both a bar code reader and a magnetic stripe reader in one housing. I tested both the PC-300 and PC-500; the PC-300 unit successfully read various preprinted bar code labels, and the PC-500 read credit cards correctly over many trials.



The PC-500 magnetic stripe reader fom TPS Electronics.

Read All About It

New literature to aid bar-code users.

In December 1981, as if to announce that the PC's arrival signaled the coming of age of bar coding, the trade magazine *Bar Code News* made its first appearance. The first issue was a simple four-page newsletter, but today's *Bar Code News* is a full-scale magazine, complete with current news stories, an editorial column, letters to the editor, and a reader's service bingo card. It is published every other month and a typical issue ranges from 40 to 60 pages.

North American Technology, Inc., publishes *Bar Code News* in Peterborough, New Hampshire. Subscriptions are free; applications can be requested from North American by calling 603-924-7136.

Recent issues included articles on automated foodstore checkout, shop floor labor data reporting, training systems using bar codes, label-printing systems, bar code systems for small businesses, and the use of bar codes in government and military service.

The November/December issue reports that more than 85 companies exhibited automatic identification prod-

The PC-300 bar code reader from TPS Electronics.



ucts at the Scan-Tech '83 conference held September 25–28 in San Diego. At the show, Hewlett-Packard announced new facilities for its bar code products activities, estimating that the $300 million current demand for bar code equipment should reach $1.2 billion by 1987. Scan-Tech '84 is being organized as a simultaneous seminar program and trade show in Cincinnati, Ohio, December 4–6. Further information on Scan-Tech '84 is available from the Automatic Identification Manufacturers Section of the Material Handling Institute, 1326 Freeport Rd., Pittsburgh, PA 15238, phone (412) 782-1624.

Future Issues

Some themes planned for future issues of *Bar Code News* are portable, medical, and industrial applications and inventory control. Editorial coverage will be expanded during 1984 to include all facets of nonkeyboard data entry, including bar codes, optical character recognition, and voice recognition.

North American Technology is responding to the growth of the projected market for automatic data entry systems with a new magazine: *Sensors—the Journal of Machine Perception*. It will deal with fundamental issues of how computer systems perceive, analyze, and gain information about the world. For example, an article might explore the interaction of the statistics of measurement with human understanding.

The *Bar Code Manufacturers and Services Directory* is another North American Technology publication. The 1983 directory includes more than 140 companies, over twice as many as the first annual directory produced in July of 1982. Having identified over 300 companies in the field, North American expects to again double the size of the new directory from the previous issue. The directory staff prepares the text using personal computers and electronically inputs the data for typesetting the publication.

The directory entry for each company includes contact information, company data, management personnel, product lines, industry segments served, and company-specific information. Product notes give details on specialty items.

At the beginning of the directory is a four-page chart that lists the companies alphabetically and shows the product areas in which each participates. The product categories themselves show the lines of segmentation of the industry into the fields of scanners, printers, data collection terminals, films and printing plates, labels and label testers, system design, seminars and consulting, database publications, trade associations, and software.

Copies of the 1983 directory are available from North American Technology for $29.95. The next directory, 1984–85, will be available in July.

Another publication is the *Scanning, Coding, and Automation Newsletter*, a monthly management-level summary report of industry and governmental developments in the United States. An international edition supplement has recently been announced. Further information is available by calling (516) 487-6370 or by writing to the newsletter staff at 11 Middle Neck Road, Great Neck, NY 11021.—**D.G.**

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Interface card for XT included

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For game port option add 34.95

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CIRCLE 112 ON READER SERVICE CARD

Three Models from Bar/Code



The Model BC-101 from Bar Code Inc.

Model BC-102 is Bar Code Inc.'s basic readers/decoder unit. It provides RS-232 asynchronous communications output and has a main and auxiliary port. The standard model translates the symbologies CODE 39, 2 of 5, and CODABAR, and the unit automatically recognizes which symbology it is reading. It can be used in parallel with CRT terminals and is available with medium- or high-resolution wands using visible red light or infrared radiation.

Bar/Code Inc.'s Model BC-101 is a high-performance translator that provides two-way computer communications via a 32-character liquid crystal display. It also includes a bar-coded keyboard on the cover for setting up operations or inputting special commands. The BC-102 and BC-101 are reliable and convenient.

The company has recently announced model BC-103, a portable reader that features up to 10 hours of standalone operation and weighs 1½ pounds. It includes a 32-character LCD display, and its internal memory is expandable up to 48K RAM for storing input data for later automatic transmission to a computer via an RS-232 communications port.

MicroBar is a flexible bar code label designing and printing program for use on PCs and dot matrix printers. It works with Bar/Code's product line. *MicroBar* is screen oriented with menu-driven function selections and prompt-driven label specifications. Label stock setup parameters include starting print position and number of print lines. Format files define the label fields, bar code symbology type, variable fields and sequencing, and other parameters. The program leads you through the process of designing practical, attractive labels. Label generation and printing functions include making test patterns, entering initial values for bar code areas, specifying the number of labels to print, and modifying field contents.

MicroBar leads you through the process of designing practical, attractive labels.



The Model BC-102 from Bar Code Inc.

Scanners from Control Module and Caere

Control Module, Inc.'s Model 1120 bar code module is a flexible, slimline unit designed to mount directly to the side of the PC. It attaches in series with the keyboard cable and inputs data to the PC by simulating keystrokes.

A bar code menu guides you through setting up the type of code and code format. Menu selections are stored in nonvolatile memory, which retains the settings until you reprogram it. The unit can decode up to three symbologies concurrently.

The 1120 is driven by an 8085A microprocessor and includes power-on memory tests of PROM and RAM. An audio annunciator gives two beeps to indicate that the unit is ready for operation after startup and a single beep to indicate the successful reading of a bar code. A lower frequency beep apparently indicates the programming or setup mode. The unit also has an auxiliary port for other devices such as a badge reader, magnetic stripe reader, or serial ASCII input. The evaluation unit successfully read in both directions when I tested it with a full ASCII chart using the CODE 39 symbology.

Caere's Corporation's Model 212 Bar Code Scanner provides a serial ASCII output interface to a microcomputer or CRT terminal. The rectangular unit stands only 1 inch high and reads several symbologies interchangeably. Supplied bar code programming menus set up variable parameters. The back of the decoder unit features both terminal and modem connectors.

The accompanying documentation carefully explains how to install, program, and use the Model 212. Unique audio beep sequences and a red visual indicator confirm programming steps during setup. The light, normally green to show the ready condition in the operational mode, changes to red to indicate that a code is being scanned. A beep confirms that the unit has successfully read a code.

Caere's 240 PCScanner model installs

INFO

To find out more about the bar code equipment mentioned in this article, contact the manufacturers listed below.

Model BC-101 Bar Code Translator
Model BC-102 Bar Code Reader (with wand)
Model BC-103 Portable Bar Code Data Collection Terminal
MicroBar
Bar/Code, Inc.
1237 Executive Dr. E.
Richardon, TX 75081
(800) 527-4719
(214) 231-2412
List Price: BC-101, $795; BC-102, $595; BC-103, $945 and up; *MicroBar*, $395
Requires: for BC-101, 102, and 103, asynchronous board; for *MicroBar*, 128K RAM, one disk drive, Epson or TI 850 printer.

CIRCLE 730 ON READER SERVICE CARD

Model 212 Bar Code Scanner
Model 240 PC Scanner
PrintBar
Caere Corporation
100 Cooper Court
Los Gatos, CA 95030
(408) 395-7000
List Price: Model 212, $789; Model 240, $745; *PrintBar*, $179
Requires: for *PrintBar*, 64K RAM, one disk drive.

CIRCLE 731 ON READER SERVICE CARD

Model 1120 Bar Code Module
Control Module Inc.
380 Enfield St.
Enfield, CT 06082
(203) 745-2433
List Price: $850

CIRCLE 732 ON READER SERVICE CARD

Model CYC-IB Reader/Decoder
BarGen
New Wave Systems
12123 Washington Pl.
Mar Vista, CA 90066
(213) 475-8545
List Price: CYC-IB, $650; *BarGen*, $345
Requires: for *BarGen*, 64K RAM, one disk drive.

CIRCLE 733 ON READER SERVICE CARD

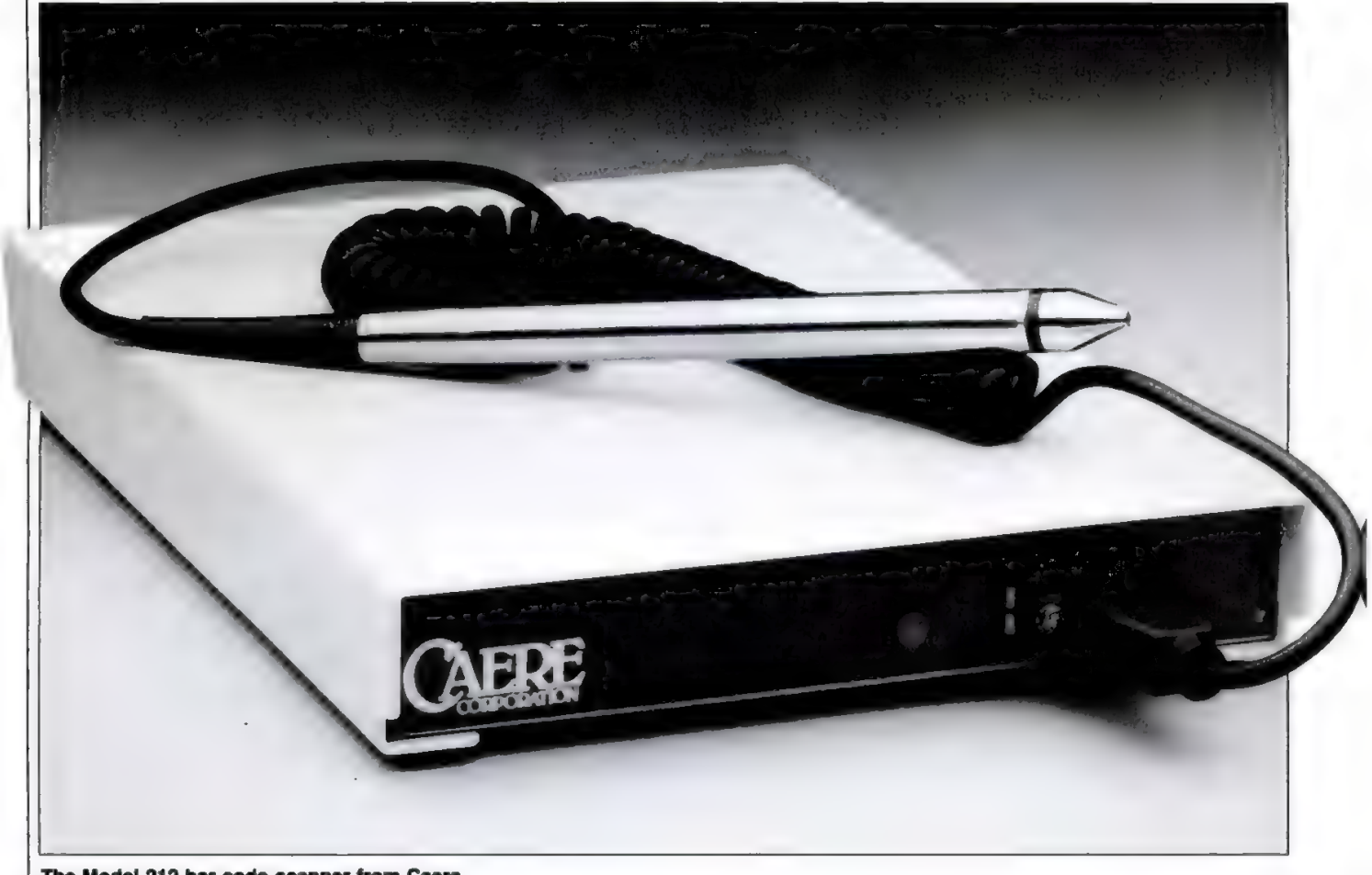
Model PC-300 Bar Code Reader
Model PC-500 Magnetic Stripe Reader
Model PC-3000 Combination Bar Code/Magnetic Stripe
TPS Electronics
4047 Transport
Palo Alto, CA 94303
(415) 856-6833
List Price: PC-300, $795; PC-500, $695; PC-3000, $995

CIRCLE 734 ON READER SERVICE CARD

Manufacturers are taking advantage of new developments as fast as they occur. New portable hand-held units use the latest in low-power microprocessors and semiconductor memory devices.



The Model 1120 bar code scanner from Control Module.



The Model 212 bar code scanner from Caere.

in half of an available PC or XT expansion slot. No external space is required for a decoder unit. This unit also provides input through the keyboard port by using a "Y" cable that connects to the keyboard connector on one end and the PC or XT keyboard port connector on the other end. Operation of the Model 240 is identical to the 212. The supplied programming menu is somewhat simplified since use of the keyboard port eliminates the need to set up asynchronous communications parameters such as baud rate.

Caere's *PRINTBAR* program, priced separately, prints bar code labels in UPC or CODE 39 symbology on an Epson FX80 or FX100 printer attached to a PC or compatible. *PRINTBAR* can generate or store label design layouts. In addition to the bar code label, you can have additional descriptive information printed on the labels in fixed or variable format. Labels can be printed up to four on a page.

The Future in Your Hand

Bar code equipment manufacturers are taking advantage of new developments in electronic components as fast as they occur. New portable hand-held units use the latest in low-power microprocessors and semiconductor memory devices.

The portable units usually include a bar-coded keyboard for entering special application-related characters, identifying the operator, or describing the subsequent data to be input by bar-code scanning. Alphanumeric displays are used to provide data verification and operator instructions.

Most inventory applications for these useful units involve storing the scanned data in the portable unit for later transmission to a host computer system. This is especially useful in such areas as hospital patient care, material receiving, and laboratory operations.

Portable bar code readers show promise of becoming the electronic clipboard of the 1980s. They are likely to play a pivotal role in the battle for productivity and job effectiveness.—**Dick Gall**

This Oscar's No Grouch

Oscar is an optical scanner reader from Databar that can turn bar codes into programs that can be used by your home computer.

A bar code printer gone berserk!" That's how a user of standard commercial or industrial bar codes might describe the continuous pages of code used by Oscar (short for Optical SCAnning Reader), a new, inexpensive home computer program input device. Oscar's developers have charged it with the task of using high-density bar codes to simplify information input in offices, factories, and even homes.

Oscar is the high-tech solution to practical bar-code-based software program input. It uses a high-density bar code and works with most home computers.

Early computer magazine publishers evaluated bar codes in the mid-1970s as a means of distributing short programs. If successful, this could have been a low-cost way to save time and effort readers spent entering programs through the keyboard with the required superhuman accuracy. These early efforts were hampered by the density of codes at that time, a lack of code symbology standardization, and the high costs of the available bar code readers.

Databar Corporation, Eden Prairie, Minnesota has developed Oscar as the high-tech solution to practical bar-code-based software program input. A real bargain, it retails for under $80, uses a high-density bar code and works with most home computers. Databar aims to make the code symbology standard throughout the high-volume home computer market.

Oscar software comes in colorful notebook-size brochures that generally include a graphic cover, a one-page description of the program and its use, and four pages of bar codes that you scan to input the program. Databar plans to expand the program library at the rate of 20 titles per month. Professionals in various fields design the programs and Databar's programmers implement them in software. *Databar: The Monthly Bar Codes Software Magazine* includes a selection of programs as well as articles of general interest for home computer users.

Oscar converts bar codes into signals that are input through a computer's cassette recorder interface. For the PC*jr* and other new computer models, Oscar will interface through an RS-232C a synchronous communications port.

The addition of a standard serial communications interface brings Oscar technically into both the personal and mainframe computer worlds. Databar has just announced plans to make an IBM PC-compatible Oscar, and appropriate software is sure to be available simultaneously. It may be just a matter of time until Oscar and his technology join the arsenal of standard tools surrounding the PC.—**D.G.**


IBM
IBM

COVER STORY/TOM CHRISTOPHER

The Digitizing Camera Picture

Artists can now use digitizing cameras to turn photographic images into a form that is able to be read and displayed by a microcomputer. PC Magazine looks at two cameras that sit at opposite ends of the micro price scale



Copyrighted material

The Low-Cost Micro D-Cam

When your noncomputerized photographer friends snidely ask, "Well, how's the new computer?", you can slap a couple of cold beers in their hands, boot up, and watch the envy slowly creep into their faces as you demonstrate the great photos you've been digitizing with your Micro D-Cam, a new digitizing camera from The Micromint, Inc.

The graphics capabilities of microcomputers have garnered a great deal of attention lately. Besides using new software to draw pretty pictures, artists are also looking for ways to "digitize" real images—in other words, to turn photographic and video images into a digital form that can be read and displayed on screen by a microcomputer.

Unfortunately, most of the digitizers now available are expensive and require elaborate equipment and software. With the recent advances in microcomputer technology, however, more reasonably priced equipment is appearing on the market. Whether this equipment can produce high-quality images is, of course, another question.

The Micro D-Cam is essentially a low-cost camera that can shoot images onto a PC screen. It costs $299 ($264 if you buy it as a kit and assemble it yourself) and comes with the camera and lens, interface card, cables, and software.

The camera differs from a standard 35mm in that it lacks a body, so there is no need for film and rollers, shutter mechanics, or a prism for the viewfinder. The whole rig resembles a rifle scope on a tripod. It swivels on a ball joint with a lock key on the shaft. The tripod legs pull out to extend from the camera shaft and end in deluxe, stamped, raw metal feet designed to skid off any surface, except possibly cork. (I don't know why the manufacturer didn't just add $1.17 to the total purchase price and supply rubber bumper shoes.)

The documentation is comprehensive and includes all sorts of technical details that will enable you to tailor the camera for special uses. Unfortunately for civilians like myself, while it goes into great detail about baud rates and the ratio of bytes per row, it neglects to remind you that the blue cable stripe goes to pin 1. (After a panicky search through the trash bin, I found a small label with directions on a vacuum-sealed pac.)

I had another moment of panic when, after unpacking all the equipment, I thought a chip was missing from the card. However, I discovered that the camera ribbon cable fits directly into the board. I think the cable should have a standard 25-prong plug like any sync connector instead of socketing directly—it seems like the slightest yank or pull would disengage it—but we had no problems.

The Optic Nerve

The real center of the system is the Optic RAM software. The Micro D-Cam electronically handles the shutter speed by controlling the Optic RAM's sensitivity to light. When the camera brings an image into focus, a digitized representation is exposed on the Optic Ram, which is made up of over 65,000 pixels. These are broken into two arrays of 128 x 256 pixels each, then sent to the computer and displayed on the screen.

When you first call up the program, you get the main menu which offers commands to alter format size or exposure time, save a picture to disk or recall it, and print. You can format your picture from about 2 × 2 inches to a horizontal image one half the PC screen. Images have a tendency to look horizontally squeezed whatever your format, apparently due to mismatched ratios of the Optic RAM at 2.5 to 1 and the CRT display at 4 to 3.

The documentation includes all sorts of technical details that will enable you to tailor the camera for special uses.

If you leave the exposure time on auto adjust, the computer will evaluate the image to determine the appropriate black and white percentages. The light level gives a readout with 100 percent as all white and 0 percent completely black. You can alter this level by hitting the K key. Once you've chosen the exposure time, the command menu will ride either below or to the right of the image on the monitor. You can call the main menu up again by punching Q.

An interesting feature called a light lev-

Micro D-Cam
The Micromint, Inc.
561 Willow Ave
Cedarhurst, NY 11516
(516) 374-6793
List Price: assembled and tested, $299; kit, $264
Requires: 64K RAM, one disk drive.

CIRCLE 706 ON READER SERVICE CARD

Photograph: Les Morsillo

el margin enables you to turn the camera into a surveillance device. If you set it at a low margin, the camera will be sensitive to any changes in light, such as somebody crossing its field of vision. It can then be adapted to activate an alarm, set off recording equipment, dial a phone number, or release the Dobermans.

A second menu is called Real Time Commands (logically, everything should have been on one menu). You hit the greater than (>) or less than (<) keys to increase or decrease exposure times. However, the manual's caveat to this feature sounds like something right out of *Alice in Wonderland:* When you increase exposure times, the computer moves in greater and greater steps until at one point "the computer may decide to decrease the exposure time in smaller and smaller steps."

The lens mounting is a standard C type, and many camera stores will carry optics to fit. The D-Cam lens is practically telephoto strength; the subjects in my photos were about 5 to 12 feet away. The focus can't adjust to any subjects closer than 12 inches, and for some reason the Micromint people suggest you focus the camera by unscrewing the lens. Since this is an excellent way to drop and crack your lens, it's not really a great idea. You must also place the camera in close proximity to your PC, since the screen is your only viewfinder.

Say Cheese

The whole picture-taking process takes a while. Exposure time is equal to the time the camera is allowed to absorb the image plus the time required to transmit the image. There's also a ratio between the exposure time and the time it takes for a picture to appear on your screen. For example, the head shots that accompany this article were "beamed aboard" in about 8 to 10 seconds. There's a complicated way of adjusting this by modifying the baud rate and soldering some pads on the interface card—but I can wait.

There are only two adjustments on the camera, the f-stop (aperture) setting and focus. It's difficult to tell if you're really in focus, and it would be nice to have a line or cross hairs to check for registration—even an indicator light would let you know whether you were hot or cold.

Images appear so abstracted at first that it's difficult to figure out what's on the screen. Incorrect focus or f-stop settings can throw it even further out of sync ("There she is . . . no, that's a lamp"). The easiest way I found to alter the picture was to adjust the light on the subject.

By toggling the H key you get light and exposure readouts on the screen. This is a handy feature, since it's a good idea to record exactly what you're doing as you go along.

When the camera is aimed at a stationary object, the image changes every few seconds, rotating through a series of black, white, and gray combinations. The manual doesn't really explain why, but I assume the camera is searching to assign a value to each pixel. The manual does say that you can get a wider range of grays by taking many shots of the same image using different exposure times, which seems like to much work for the result.

If your subjects are alive, they must hold still for the entire exposure time. But once an image is captured, you can immediately freeze it by pressing the Ctrl and NumLock keys on the PC.

The great feature of an inexpensive camera like this is that it can quickly grab a high-contrast, graphically strong image. The problems are minor and the system can be used in print and slide work for graphics, illustration, business presentations, and possibly in conjunction with color software packages. At any rate, it's a fun system with a lot of potential—and with a price under $300, you can't lose.

The High Quality Datacopy Model 90

Digitized image processing is the next step in a business-world microcomputer revolution that began with the manipulation of numbers and words. Digitizing camera systems now permit images, or even text, to be photographed, broken into tiny picture elements and stored in a PC for future manipulation, communication, or printing. They are, in fact, input devices, although the information they enter is in the form of pictures.

Most high-quality digitizing systems now cost between $25,000 and $300,000—out of the reach of many businesses. The Datacopy Model 90 integrated imaging system is the first professional-

Datacopy Model 90
Datacopy Corporation
1215 Terra Bella Ave.
Mountain View, CA 94043
(415) 965-7900
List Price: $9,945
Requires: 256K (640K recommended) XT or hard disk, one disk drive, Hercules Graphics Adapter.

CIRCLE 706 ON READER SERVICE CARD

quality system for the IBM PC that is somewhat affordable. For just under $10,000, it does as good a job as a $25,000 scanner in digitizing photographs, drawings, text, and three-dimensional objects. Once you store them in a PC you can change the contrast of the Datacopy's images, enlarge them, reduce them, or crop them in any way. You can drop an image into word processed text or send it by modem to other computers.

The Model 90, which runs on an XT or a PC with a hard disk, is made by Datacopy Corporation of Mountain View, California. So far, the company is only producing about ten systems per month. Because of this scarcity and the system's size, Datacopy was reluctant to ship one to *PC*'s New York offices for review, so I had to go there to examine it and only had a short time to do so. (Going to Mountain View at that point was no hardship. A terrible blizzard was flattening the entire eastern seaboard, while there skies were blue and everyone looked as if they had walked in off the beach.)

The Hardware

The Model 90 includes an electronic digitizing camera, an image-processing interface, imaging software, a power supply and cable assembly, a camera stand, lights, and a lens set. The digitizing camera, which has a 35mm lens attached, is slightly larger than a standard one and moves on a vertical rack-and-snail arrangement similar to that of an enlarger used for making darkroom prints. It can swivel in any direction or face down onto a table that resembles a large television cart. The cart has two podlike lights attached to arms set at a 45-degree angle.

You can use the camera to capture any three-dimensional object or photograph existing flat art or text placed within the table's 11-by-17-inch field. Inside the camera, a linear array of 1,728 solid-state photosensors scans across the image, organizing the information into a grid of tiny picture elements (or pixels). As it does this, it is actually converting the image into a signal representing the intensity of light in each pixel. This signal is then further converted into a data stream representing two dimensions with each pixel representing 256 shades of gray. The image is now in computer-readable form.

The Software

Once on the PC, the image is reduced and takes up only about two-thirds of the screen. The Datacopy's imaging software saves the image at 1,728 x 2,846 pixels.

The Model 90 includes an electronic digitizing camera, an image-processing interface, imaging software, a power supply and cable assembly, a camera stand, lights, and a lens set.

Because the PC's 740 x 320 pixel resolution is not as high, only part of the image can be displayed on the screen. As a result, it lacks detail and looks coarse.

Photographing an image and sending it to the PC's screen takes about 20 seconds and recalling a Datacopy image from the files takes about 35 seconds. From the PC, you can send the image to a high-resolution screen, printer, or via modem to other computers.

A menu on the right side of the screen lists commands that allow you to manually set the focus and threshhold (brightness and contrast), or they can be set automatically by the program. With other commands, you can transfer, recall, or file images, or reduce them along the *x* or *y* axis.

The software permits you to zoom in on a particular screen segment and expand it to take up the entire screen. A windowing function permits you to scan and file any rectangular portion of the full image. Using these functions, you can adjust the focus for crisper lines or crop images for printing with a mouse or the PC's cursor keys.

You can print the Datacopy's captured images on any bit-mapped printer, whether dot matrix or laser. It will print images at the full 1,728 x 2,846 pixel resolution, and they can be integrated with word-processed text.

I had little time in which to test the Datacopy Model 90. After considering all the intelligent and significant applications of a digitizing system and ways of demonstrating its capabilities, I decided to stick my hand under the lens. The resulting picture (see Figure 1) is a bit distorted—it's slightly elongated and condensed. But even though I didn't spend much time fine-tuning the image, the printout of my hand from an Epson printer is pretty sharp. The Datacopy Model 90 is the only system in its price range I know of that can capture fine print as small as 4-point type.

Of course, a machine so precise is rather delicate. Datacopy tests its camera systems for resistance to heat and cold, but the "torture chamber" in which it does this is set for the "extremes" of 35 and 110 degrees Fahrenheit, barely rigorous enough to certify it for use in an average Manhattan apartment. (See what California living does to you?) However, the system is probably safe enough to use in most offices.

The digitized image has many possible uses in business. For example, many real estate companies currently use slides or books of photographs to show properties to buyers. If these photographs were stored on a PC, an agent could, for example, enter a buyer's preferred size, location, price range, zoning regulations, and school districts, and receive a printout of available properties with floor plans and photographs. The technology would also

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be useful in banking to store signatures and customer photographs, in law enforcement, in machinery sales, in museums to record collections, and in the art, rare coin, and antique markets. Any business that needs pictures captured, saved, and printed economically along with text could use a digitizing camera system.

A digitizing camera system of the Model 90's quality may be able to replace the photostat and halftone screening process now used in offset printing. Digitized images could simply be transmitted directly from a PC into an electronic typesetter, which would produce them in a form suitable for offset printing. Many people would be happy to scrap the various darkroom supplies needed to make photostats, which include some dangerous, mind-eroding chemicals. (I have seen people who worked with these chemicals for years reduced to the cerebral deftness and flexibility of small tortoises.)

Datacopy tests its camera systems for resistance to heat and cold, but the "torture chamber" in which it does this is set for the "extremes" of 35 and 110 degrees Fahrenheit.

Dr. James McNaul, a vice-president of Datacopy, says the company envisions the Model 90 as part of complete, in-house publishing systems at large corporations, in which word processed text integrated with images would take the place of typeset text with photostatted and screened images inserted. Companies could maintain databases of images as well as other forms of information. Eventually, he says, organizations will combine imaging systems with microfiche, one of the cheapest ways to store data. When needed, the images on microfiche could be entered into a computer, manipulated as needed, and combined with text for printing.

Datacopy has sold about 50 Model 90 systems since its introduction in December 1983, mostly to original equipment manufacturers such as Honeywell and Hewlett-Packard, for packing with computers and specialized software and hardware. Other buyers include the Smithsonian Institution, which uses it to capture and record odd documents. ■



Figure 1: *A picture of the author's hand, as captured by the Datacopy Model 90's electronic digitizing camera, stored on an XT, and printed out from its files.*

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The Microwriter Alternative

Microwriter is a book-size word processor with 8K of memory and only six keys. It plugs into anything with an RS-232 port and produces standard ASCII files. Best of all, it's a snap to learn.

Keyboards can drive you crazy—all of them, from QWERTY to Dvorak, from the much-beloved IBM Selectric to the much-maligned IBM PC. Learning to use a keyboard is not easy. It takes time, effort, patience, concentration, good left-right hand coordination, and loads of practice. While it's certainly true that an accomplished touch typist can zip along at 80 or 90 words per minute, the rest of us three-fingered klutzes have to struggle along as best we can.

There must be a better way!

Millions of people have made that plea, usually while staring at a page of inadvertently mangled text. But few practical answers have been offered until now.

The answer is called the Microwriter. Born in the mind of an American film director and nurtured by a huge British insurance company, this nifty little device has just recently become available in the United States. It's as personal a personal computer as you're ever likely to find: it weighs only 2 pounds and takes up about the same space as a small hardcover book. Its 8K of internal CMOS RAM holds the equivalent of about five pages of double-spaced text. Powerful word processing and formatting software is permanently loaded in. It interfaces with anything that has an RS-232 port. And you talk to it through six keys that are designed to fit neatly beneath the five fingers of your right hand. Best of all, it's a cinch to learn, even for left-handed people.

Microwriter officials say they have done extensive tests with lefties and found that most had no trouble learning to use a right-handed Microwriter. However, for those who do, the company will customize a left-handed unit. So far, it has made about five such units.

This particular tool wasn't designed for touch-typists (unless they need to write in places no typewriter or "portable" computer could ever go). It was meant for everybody else. The Microwriter is a remarkably simple and flexible device whose potential applications have just begun to be explored. And it's my bet that a lot of people—myself included—will stop saying, "There must be a better

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microwri

way!'' and start asking, ''How did I ever do without this?''

Microwriting Made Easy

Here's how to use Microwriter.

Step 1: Press the little white button that turns on the rechargeable power (good for up to 30 hours).

Step 2: Curl the thumb and four fingers of your right hand lightly onto five of the Microwriter's six brown buttons. Ignore the lower left button for now—that's the Control key.

Step 3: Start tapping!

By using different combinations of the fingers, you can generate the entire alphabet and the most common punctuation marks.

Of course it's not quite as easy as that to use Microwriter, but nearly so. The trick is knowing which taps create which letters.

After you have powered up the machine, tapping any key will cause a backwards checkmark, like this, to appear on the 15-character liquid crystal display:

The checkmark is the symbol for a document separator, a memory tag that makes it easy to find where the files you write into the Microwriter's RAM begin and end. It also marks the start and stop points for transmissions of documents to a printer, monitor, or computer.

After you've got that first symbol, the keys become fully active. A tap of the index finger produces a lowercase *e*. A tap of thumb and index together produce an *i*. Put down all five fingers and you'll get a *p*. By using different combinations of the thumb and four fingers, you can generate the entire alphabet and the most common punctuation marks: period, comma, hyphen, and apostrophe. To capitalize a letter, you tap the Control key by itself first and then hit the letter code. To put the Microwriter into Caps Lock mode, you tap Control twice. An uppercase *U* appears in the right corner of the readout, beneath a transparent yellow strip, to tell you what mode you're in. To return to lowercase, you tap the thumb and Control keys together.

You can take the Control feature even further. Used correctly with the other keys, it can place the Microwriter into four different modes that enable you to write numbers, additional punctuation marks, and indeed, the entire ASCII character set; move around in your text to do corrections, insertions, deletions, and print formatting; and even customize the baud rate and parity bit settings. Hundreds of different commands are possible, so many that

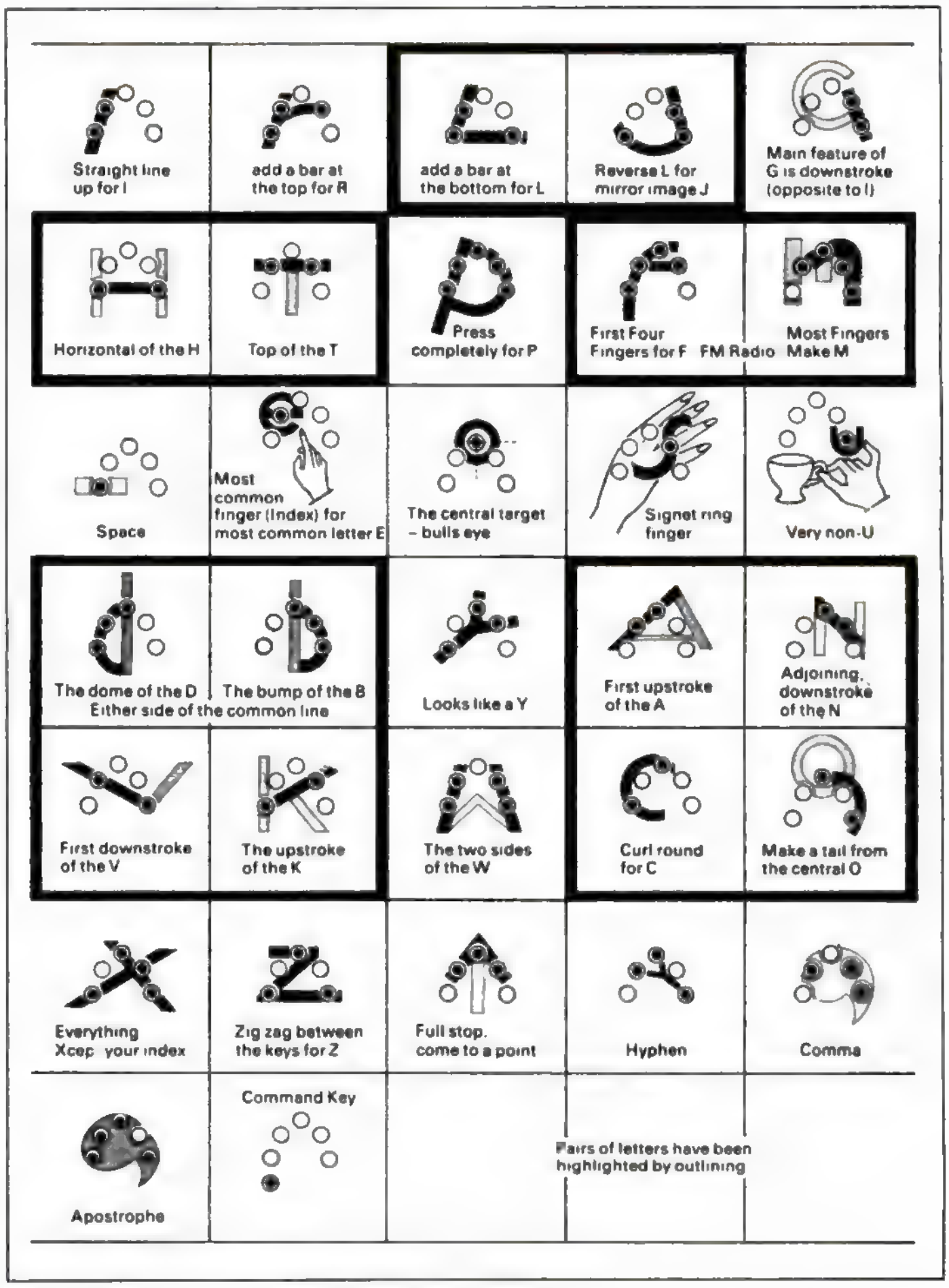


Figure 1: *Microwriter's alphabet mnemonics make it easy to learn the six-key pad.*

you'd think the system would be tough to learn. But in practice, it turns out not to be tough at all.

The fact that I could learn it proves that it's easy. As a youngster in Boy Scouts, I showed no aptitude for Morse code and a dunce's grasp of semaphore. My performance in my high school typing class was a disaster. Yet my hand, seemingly by itself, proved a wizard at Microwriting.

Hand to Brain

The trick is in the hand chiefly because all you need is one. Microwriting, unlike typing, involves no left-brain to right-brain maneuvering. Also, the neuromuscular systems in your hand are very smart. Every day these systems effortlessly accomplish little miracles of precision without your conscious control, from manipulating chopsticks to drumming with impatience when your phone call has been put on hold. It's no big surprise, then, that given a fairly rational system and a good set of mnemonics, your hand can master Microwriting in no time.

Microwriter's system of mnemonics is elegantly thought out and clearly described in the manual, which is, in general, very clear. Some of these mnemonics are visual, such as the one for the letter *h*: the thumb and little finger create the crossbar. Some are symbolic: tapping the middle finger, the very center of the hand, is like hitting the bullseye, and it gives you an *o*. Some of them are wordplay: "signet ring finger" means *s*. (See Figure 1.) In well under an hour I had memorized the keystrokes for the entire alphabet. Numbers and punctuation took about another 20 minutes. After I had those down, the various Control commands were really easy, because they varied from the letters only by the shift of my thumb from the upper key to the Control key.

Microwriting definitely beats touch-typing in ease of memorization. Speed is another matter. According to Microwriter USA Limited, the distributors of the device, most people using the keypad can do so at about half again the speed of handwriting. Although a few people can blitz those buttons at 50 or 60 words a minute, Microwriter's speed simply can't match that of a topflight typist. No matter. Microwriter wasn't designed for touch-typists.



Although a few people can blitz those buttons at 50 or 60 words a minute, Microwriter's speed simply can't match that of a topflight typist.

Microwriter's Pedigree

Microwriter began in the mind of American film director Cy Endfield as a forlorn hope that there *was* a better way than plain typing, and this hope refused to go away. Endfield, director of *Zulu* and a resident of England for nearly 30 years, found what he was seeking by developing Microwriter's one-handed concept with the help of a group of British electrical engineers.

Eventually, his prototype attracted the interest and backing of the Hambro Life Assurance Company, a large British firm.

Computers and electronic technology were new fields for Hambro, but the company waded in anyway with the same determination and caution that had brought it success before. Market testing and production of Microwriter began in late 1978 and has been carefully shepherded since.

Paul Cutler, head of the company's United States office, which opened in the summer of 1983 says: "About 6,000 Microwriters are out there now, 500 in the United States. We've had a steady progression since we began; we haven't tried to rush things, because we wanted to be very certain that when we stepped forward we wouldn't also be taking two steps back."

The first major step in Hambro's careful planning was to make certain that Microwriter worked with every system it possibly could.

"Does the device you want to plug the Microwriter into have an RS-232?" asks Cutler. "If not, can one be added? If the answer to either of these questions is yes, and you have some communications software, then you're in business."

The Microwriter can work with any monitor using an auxiliary monitor interface box and cable that is available from the company on special order. It can drive directly any printer with a serial interface (such as Diablo and Spinwriter Printers), and electronic typewriters such as the Brother, Silver-Reed, and Olivetti. It can also be hooked up to a home computer.

Making it work with a PC proved fairly simple after I solved one glitch. The Microwriter manual's interfacing chart said to use the standard IBM Asynchronous Communications Adaptor and IBM's own Asynchronous Communications Support Program. The card worked fine. But for some reason the software wouldn't run properly—parts of it kept self-destructing in the RAM, and the screen gave me endless Undefined Value Error messages for program lines that no longer existed. Finally I gave up on Big Blue's software and used PC TALK

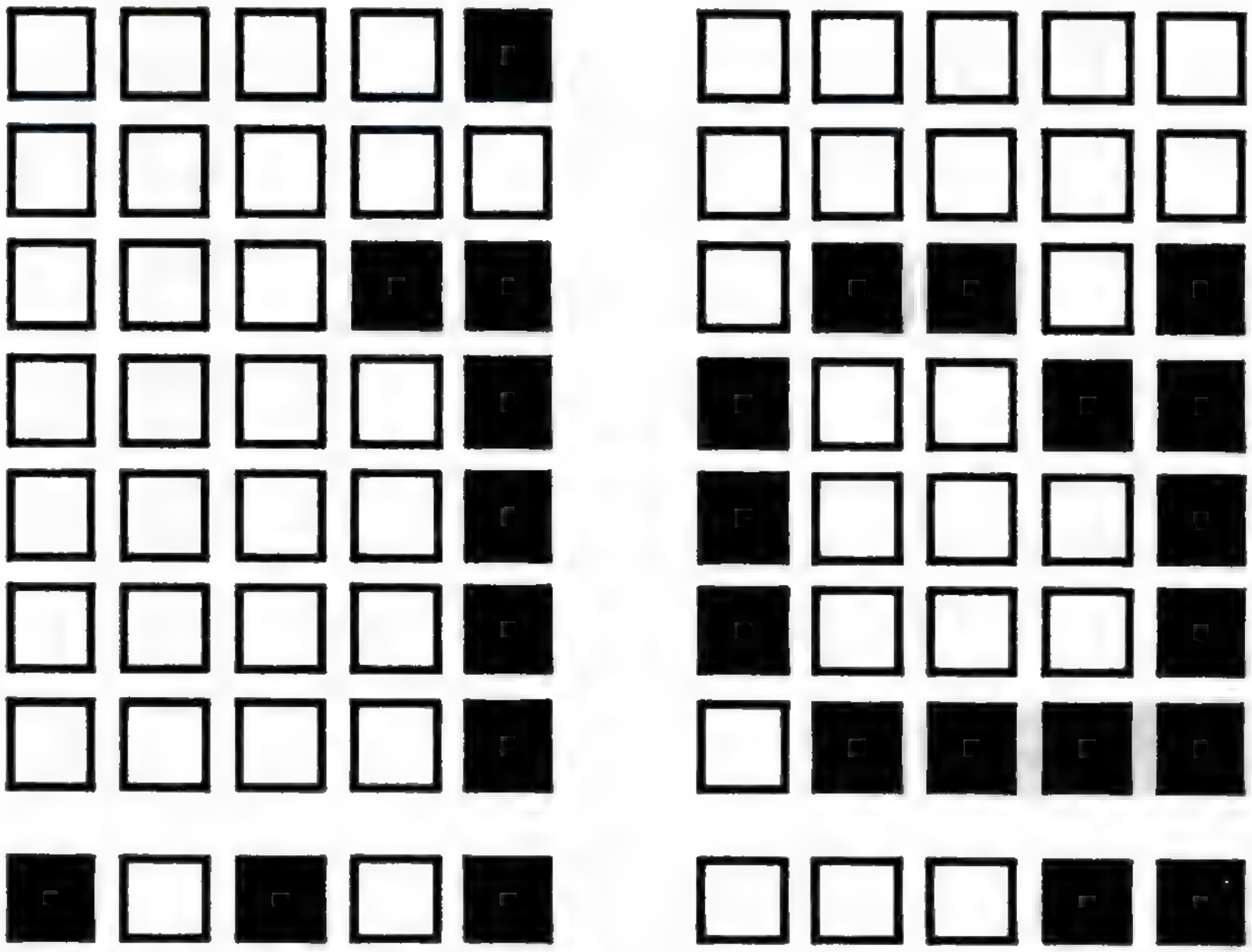


Figure 2: *The Microwriter's LCD grid displays letter descenders incompletely, using dots on a separate line below the main grid. On the left is a Microwriter* j, *on the right, a* q.

instead, which worked like a dream. A series of test files written in the Microwriter's memory, complete with all its formatting commands, transferred effortlessly (using the Microwriter's Control-X command) and were saved to the PC's disk. Since they are standard ASCII files, from there I could print them out, or edit and alter them with *WordStar* or some other software package, using the standard PC keyboard. To manipulate commercial software packages on the PC using Microwriter would take some extensive custom programming on your part. But even without that, Microwriter has myriad possible uses.

Say you're a technician in the field, a businessperson on a commuter train, or a salesperson on the phone—it doesn't matter, as long as you need to write in a situation in which a normal keyboard simply would not work.

A salesperson with one hand on the phone could still have a hand free to take detailed orders and specifications faster than handwriting and without the illegibility of a hurried scrawl.

Useful Possibilities

A field technician could roam anywhere, one hand holding the Microwriter and the other taking notes. (It generally isn't necessary to look at the display strip. The typical unpracticed typist might hit any number of wrong keys. Since on a Microwriter, your fingers are already on the right keys, they cannot slip and hit the wrong keys. The handshape for *f* on a Microwriter is only that, and nothing more. You'll never get a *d* or a *g* by mistake unless you forget the hand shape.

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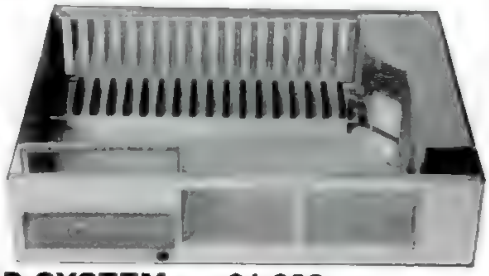
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Typos are drastically reduced.)

A businessperson on a commuter train could hold a Microwriter balanced easily on his or her lap or briefcase, and finish a morning's worth of memos despite a ride bumpy enough to make normal typing impossible. (I verified this claim on the infamous New York IRT subway line. It takes a little practice, but it can be done.)

A salesperson with one hand committed to keeping the phone attached firmly to his or her ear could still have a hand free to take detailed orders and specifications, faster than handwriting and without the illegibility of a hurried scrawl.

All of them could then use the nearest computer or printer to quickly transfer their notes to whatever electronic or hard-copy form their business requires, without the hassle and delay of retyping.

"So far," says Cutler, "a lot of our users have been technical people: doctors, laboratory researchers, people who have lots to write down and who often use symbols and characters that it is difficult for a typist to transcribe with accuracy and speed. With Microwriter, people who understand the terms are doing the writing, so they know it's correct—and of course they can get a copy for themselves immediately. In addition, research people like to be independent. Quite often they don't seem to get along well with administrative staff; something like the Microwriter can go a long way towards bridging the gap without compromising their independence.

"Of course," Cutler says, "I shouldn't imply that most of our customers are doctors or engineers. They're not. They're what we call 'thinker-writers,' usually professional people at the middle-management level. They draft reports with a pen and paper, talk into a dictaphone, or sit at a computer or typewriter tapping away with two fingers and getting very frustrated. When you think about it you realize that there are several million people who fit into that category. The Microwriter could potentially be of use to them all."

Quibbles

Despite its many good points, some things about the Microwriter could be improved. Its 8K RAM limitation is a frustrating holdover from the days when low-power consumption CMOS chips with more memory were too scarce and too expensive. Now, prices for these chips are dropping steadily. A 16K version is planned, and current Microwriters can be updated by just plugging the new chip in. In the meantime, the device's cassette I/O port and any decent cassette or microcassette recorder allow you to store your documents for later recall whenever you run out of available memory.



Microwriter's 8K RAM limitation is a frustrating handover from the days when low-power consumption CMOS chips with more memory were too scarce and too expensive.

Another Microwriter feature that could be improved is the way it shows letter descenders on the display. Each letter is made up from small squares on a five-by-seven grid, underlined by a blank space and a single line of five more squares. The descenders are represented by dots in that bottom line. (See Figure 2.)

This particular flaw is minor, since it doesn't take long to learn to distinguish the letters with descenders from one another. It's a good thing you can, because this isn't a flaw that will soon be fixed. Economics dictate that Microwriter Limited use an available, off-the-shelf LC display, and as it would take a special order of nearly 100,000 displays to make a custom design affordable, unabbreviated descenders aren't likely to make an appearance soon.

Microwriting to Come

These are minor quibbles. In 3 years of beating my head against the Big Three Frustrations of the microcomputer field (bad software, bad hardware, and bad manuals) this is one of the few products I've encountered that actually did everything it claimed it would—and maybe even a little more. I mean, who says it has to be just a writing tool?

Lately, my work with computers has been moving more and more toward extended musical and graphic performances. Microwriter could command a graphics or music installation that has hundreds of interactive instructions and programs stored away, and make them accessible with a few quick taps of the keys.

Such a system would require a little jury-rigging, but not much. It would be a whole new dimension to explore—literally striking chords on my computer, the way I might on my guitar.

That's one possible new twist. I'm sure I'll find more, as will others who get caught by the Microwriter bug.

In the meantime, it goes where I go. Ideas come up at the unlikeliest times and in the unlikeliest places. Whether I'm on the IRT, an airplane, or the merry-go-round in Central Park, the Microwriter is the surest way I've yet found to make certain my ideas don't pass me by. ■

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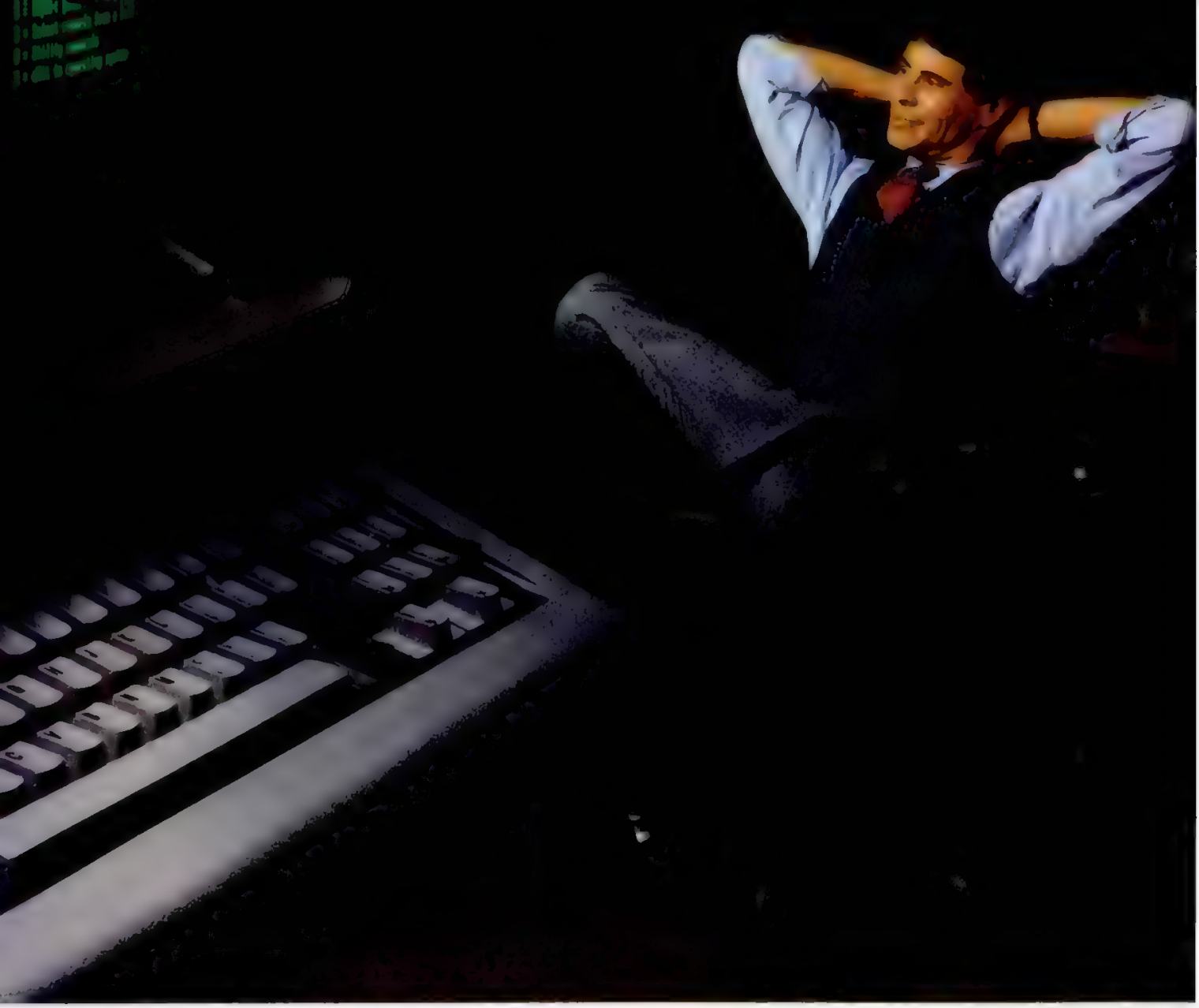
Voice-activated input devices for the PC are on the way from Votan and Key Tronic, and Supersoft's offering is available now. But the Speech Command System for the TI Pro is the most sophisticated system around today.

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For the next few years, at least, these abilities will remain in the sole possession of human beings, for computer speech recognition is very primitive compared to anything people are used to. But at least three manufacturers—Votan, Texas Instruments, and Key Tronic—do have microcomputer products that can, to some extent, recognize human speech and use it as input.

Human speech-recognition capability is eons ahead of anything that machines can do. Working to narrow this gap, the computer world is engaged in three areas of speech-handling research: speaker independence, recognition and interpretation of a very large vocabulary, and recognition and interpretation of continuous speech.

Speaker independence is the ability to recognize the same words spoken by different people—an ability that no current microcomputer product possesses. Everything now on the market is speaker-dependent, which means that before any individual can use the speech recognition system, the system must be specifically "trained" to recognize that person's voice. Voice Control Systems, a company that spun off from Texas Instruments' speech recognition activities, is working on speaker-independent speech recognition technology, but it has yet to release a commercial product based on it.

Not only must the system be trained to recognize each individual speaker's voice, it must be taught to recognize a specific and comparatively small vocabulary. The products considered here can handle anywhere from 50 to 200 words at a time—a far cry from what would be needed to implement, say, a system that could take dictation directly.

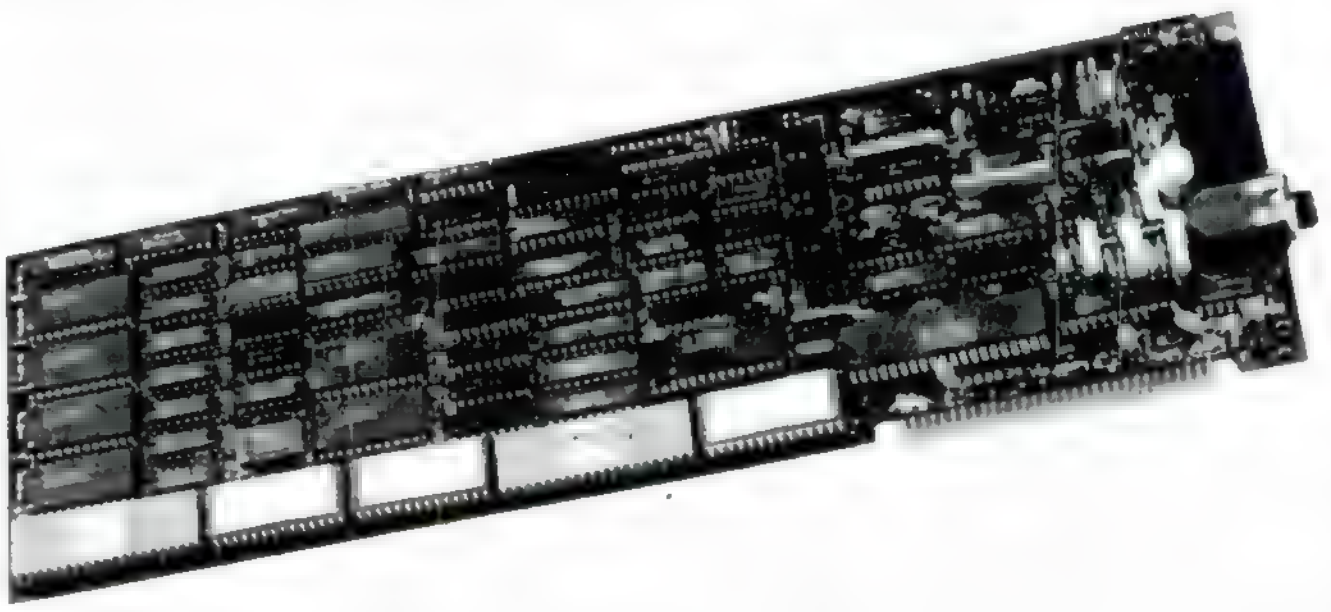
The third hurdle in producing useful speech recognition systems is deciphering continuous streams of words. Only Votan and Texas Instruments have products that come close to dealing with normal, continuous speech; other products require you to speak individual words with measurable pauses between them.

On the Horizon

Perhaps the most sophisticated product yet designed for the PC is Votan's VPC 2000 Voice Card, which should be available later this year. The VPC 2000 will possess continuous speaker dependent recognition (CSDR), which means that the user can speak normally, without artificial pauses between words. Users will be able to define up to 64 voice commands per applications program, out of a total vocabulary of 75 words. Additional words could be stored on a disk.

The VPC 2000 will also have a voice-response option, enabling the user to hear a verbal confirmation of commands input to the system. The user will be able to choose whether or not a voice response message will confirm each individual command.

Votan claims that its Voice Card will be able to work with *1-2-3*, *VisiCalc*, and *WordStar*, as well as with many other popular applications programs. In fact, it should work with any program that uses DOS calls for keyboard input. Votan says



The VPC 2000 Voice Card from Votan.

VPC 2000 Voice Card
Votan
4487 Technology Dr.
Fremont, CA 94538
(415) 490-7600
List Price: $2,450
Requires: 128K RAM, expansion slot.

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Photographs: Les Morsillo

that several third-party software vendors will soon announce products that take advantage of the VPC 2000's capabilities.

In addition to voice control of applications software, the VPC 2000 will offer sophisticated telephone management capabilities far beyond today's simple answering machines. They include auto-answer, auto-dial, and voice store and forward (voice mail). The system's telecommunications features include dual-tone multifrequency (DTMF) decoding and encoding, which, coupled with its voice response capability, will permit program interaction from remote locations.

Priced at $2,450, the VPC 2000 will consist of a printed circuit board that will plug into any free expansion slot on a PC, a small piggyback board that adds the voice and phone capabilities to the system, a microphone, and a speaker. A keyboard driver program called Voice Key Software and Votan's Voice Operating System (VOS) will also be included with the VPC 2000 package.

Human speech-recognition capability is eons ahead of anything machines can do.

The Voice of Today Is from TI

Although TI has announced no plans to make its Speech Command System available for the IBM PC, the product is still worth the attention of PC owners. For one thing, it's available now, and if you desperately want speech recognition for a particular application, it's the best market-tested package around.

TI's Speech Command System, priced at $2,600, consists of a hardware board that fits one of the TI Professional Computer's expansion slots, plus a supporting software package. When you speak into the microphone, the system converts sound waves into equivalent electronic analog signals. The speech board's hardware converts those analog signals into the bits-and-bytes digital representation that the computer requires. This technique is called "linear predictive coding" (LPC). LPC turns 1 second of human speech into about 300 bytes of digital data, and the same circuitry can turn the 300 bytes back into a reasonable approximation of the original speech. The TI board, therefore, can turn the computer into a very expensive tape recorder with the advantage that chunks of speech, because they are turned into standard binary disk files, can be copied, appended one to the other, or worked on by an appropriate program just like any other DOS file.

But the interesting feature of the Speech Command System is its speech recognition capabilities. Speech recognition is a process of matching what you're saying now against a set of words you've said to the computer in the past. You choose a vocabulary (50 words at a time) and "enroll" the vocabulary with the computer by speaking the commands into the computer's microphone. It converts them, using LPC, into digital representations called "templates."

To use the computer's speech recognition capabilities, you speak one of the words into the microphone. The computer codes it again and compares the coded representation of what you've just said against the templates in its vocabulary. The computer looks for the template that is most similar, statistically, to what you've just said. If it finds a template that is sufficiently similar, it concludes that it has "recognized" the word you spoke.

Using TI's "transparent keyboard" feature, you can associate recognized words with specific commands. The transparent keyboard concept is similar to the idea of programmable function keys. When you hit a function key on your keyboard, the program that's running thinks you've hit a sequence of other keys. *WordStar*, for example, is set up so that hitting the F10 key produces the sequence Ctrl-QC, which *WordStar* understands as "go to the bottom of the document." *WordStar* does not know or care whether you hit F10 or Ctrl-QC; it merely goes to the bottom of the document.

With TI's transparent keyboard, each word or phrase template you enroll is associated with a set of keystrokes. You establish that the spoken word "bottom" is equivalent to the Ctrl-QC keyboard sequence. Then, when you have *WordStar* running and the transparent keyboard soft-

Speech Command System
Texas Instruments Inc.
Data Systems Group
P.O. Box 402430
Dallas, TX 75240
(800) 527-3500
(214) 994-6611
List Price: $2,600
Requires: Texas Instruments Professional Computer.

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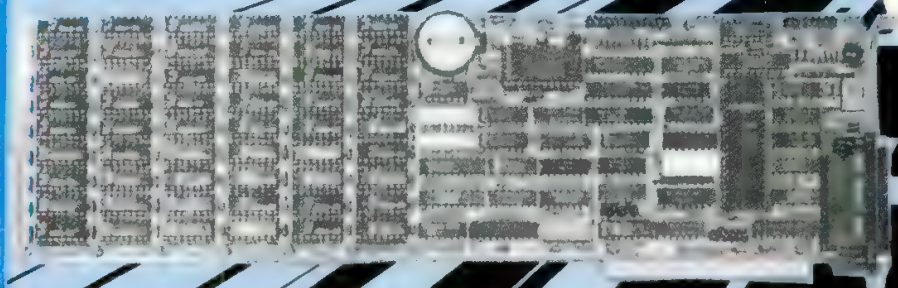
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The Speech Command System from Texas Instruments.

ware in place, if you say "bottom" into the computer's microphone, *WordStar* will react as if you typed Ctrl-QC on the keyboard and move to the bottom of the document. The vocabulary you choose is entirely your affair. It won't care if you associate the word "rutabaga" with the Ctrl-QC sequence and will happily move to the bottom of your document every time you say "rutabaga."

You quickly learn not to get too fancy; it's easy to forget what words you trained the computer to understand or what features you set up for voice control when you have a 50-command vocabulary. You also learn that the computer has a much easier time deciphering long words or phrases than short ones. "Up-arrow" (three syllables) is much easier for it to deal with than "up" (one very short syllable). You learn not to include both "brown" and "down" or "stop" and "top" in the same vocabulary. The machine gets confused.

The TI system can cope with continuous speech—it can extract the relevant sounds from the sentence "Please move to the rutabaga now," and it understands that a stream of commands such as "up-arrow, up-arrow, up-arrow, delete line" means it should delete the line three up from where the cursor is. You don't have to wait until each action is performed before moving to the next command. But the system isn't 100 percent reliable at this, and because matching words takes time, you can easily get ahead of it. If it missed one of the up-arrow commands, you might find the wrong line being deleted.

Of course, the usefulness of this voice recognition capability depends entirely on the software. And since the product has been on the market only for a short while, there's very little applications software designed especially for it. If you want to develop your own speech recognition applications, TI will sell you a software development kit for $8,000. Otherwise, you can use the transparent keyboard to set up vocabularies and speech templates for any existing software, including games. You can also set up a vocabulary to execute DOS commands under speech control. Since you change transparent keyboard vocabularies through DOS commands, you can set up the system to let you speech-command your computer to load your word processor or spreadsheet and simultaneously to load the appropriate vocabularies to speech-command them.

> Speech recognition is a process of matching what you're saying now against a set of words you've said to the computer in the past.

Speech-commanding existing applications software is nifty but probably not a great leap forward. TI claims that many business people are keyboard shy and will relate better to speech control of their computers, but I'm not convinced. Saying "up-arrow . . . up-arrow . . . up-arrow" to your computer is no easier than hitting the up-arrow key four times, and you'll want to be sure you have the door to your office closed so no one can hear you talking to a machine.

But more software specifically designed for the Speech Command System is coming. TI has signed an agreement with SuperSoft, an Ohio-based software developer, to redesign its word processing and spreadsheet packages for speech control. TI and others see applications in the area of computer systems for the physically handicapped and in any situation where hands-free control of the computer is desirable. (Picture the quality control people on a car assembly line walking around a new car and saying into a wireless, headset-mounted microphone "dent . . . fender . . . left."

The Speech Command System already includes a specially designed program that turns the computer into an answering machine; the board includes two standard telephone jack sockets, one of which is to be connected to the wall jack, the other to a telephone. As an answering machine, the computer records the exact time of each call. It can display messages you have on the screen, and you can listen to, copy, or delete messages randomly.



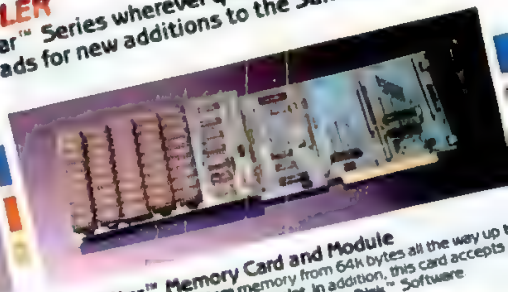
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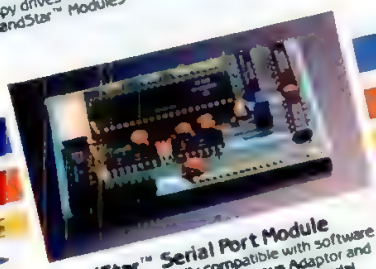
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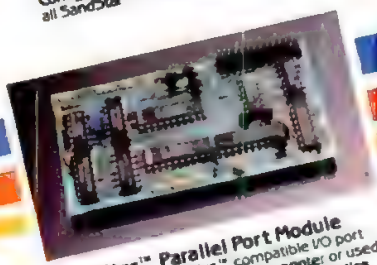
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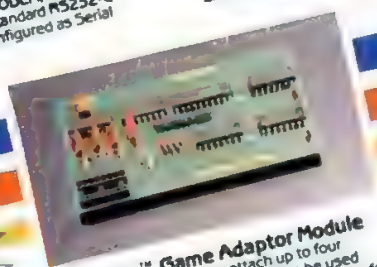
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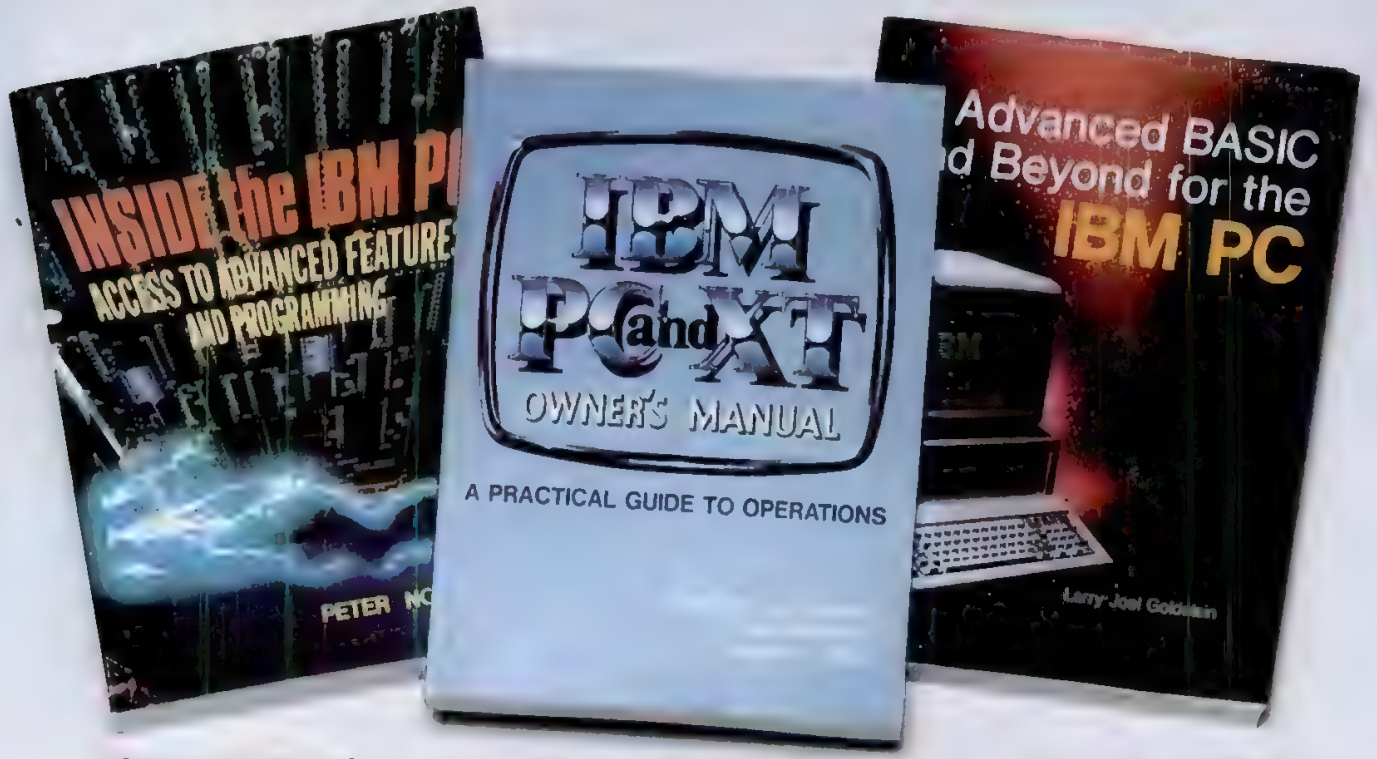
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CIRCLE 110 ON READER SERVICE CARD

Remember, each message is just a bunch of bytes in a standard DOS file.

The answering machine possibilities don't stop there. Eventually, we may hear something like this: "Hello, this is Fred Miller's answering computer. He's not in now, but if you'll state your name, I'll see if Fred has left any messages for you." If regular callers had enrolled their own voices saying their own names, the computer could recognize them over the phone and play back a specific message. If it didn't recognize the person's name, it could say, "I don't seem to have enrolled you yet, but next time you call, I'll recognize your voice" and proceed to save the caller's voice as a new template. Message pickup and other remote features could be voice-controlled by Fred from any phone in the world. Similar software could be used by salespeople to enter telephone orders. They could phone in and say "customer . . . three . . . seven . . . two . . . item . . . four . . . five . . . nine . . . six . . . quantity . . . three," causing the company computer to prepare a shipping order for three 4596s to customer 372. This, of course, is still in the future.

The Speech Recognition Keyboard

Key Tronic is in the keyboard business. Its philosophy is: "Incorporating other input devices in the keyboard makes sense because the keyboard input port is underutilized, and the keyboard is one of the few devices not getting smaller," because of the size of the human hand.

The company's new keyboard model for the PC, the Speech Recognition Keyboard, will offer voice control and a mouse as options. The keyboard itself will improve on the layout of the PC keyboard by splitting the numeric keys from the cursor-control keys and by moving the function keys up above the main keyboard, where it will be easier to label them.

Key Tronic's voice recognition system functions as a transparent keyboard. The microphone is plugged into the keyboard, the speech recognition circuitry is inside the keyboard enclosure, and the signals that go out to the computer in response to voice commands look like they come from the keyboard—because they do.

The product comes with a software support package to set up vocabularies, each of which can contain up to 100 words. The Key Tronic software will help you create templates in the keyboard's onboard speech recognition memory and establish keystroke equivalencies. The software can then store the templates on a system disk. When you want to run the software, a couple of DOS commands transfer the vocabulary from the disk to the keyboard. Then you can use the microphone to command the software.

Key Tronic's product is scheduled to be available this summer. With the voice recognition option and supporting software, it will cost $1,495. (The mouse option will add approximately another $225.)

Wait It Out

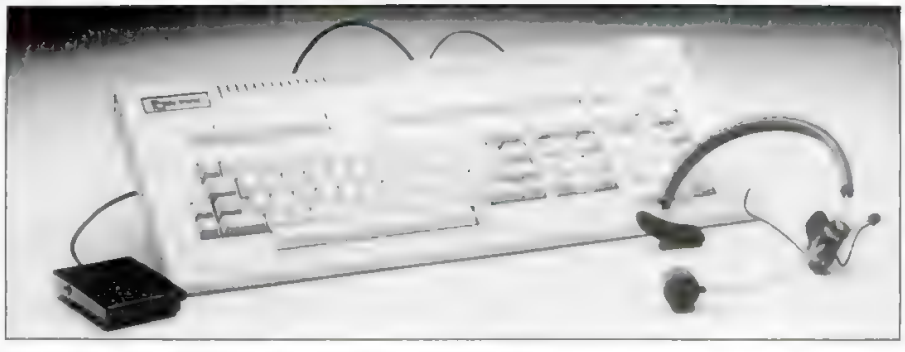
Can you live without a product like the ones described here? The answer, at least for now, is almost certainly "yes." Speech recognition has developed to the point where special-purpose software developers, who have identified applications for which speech input would be a meaningful advantage, should start to go to work. The hardware is ready. But casual, everyday use of speech as an input mechanism is still some way off. Proponents call voice recognition "the most natural way to communicate with a computer," but this back-to-nature movement may have to wait until the end of the age of the mice, until some significant applications are developed, and until its prices come down. **—John Helliwell**

Research assistance was provided by Wendy McKibbon.

PC FACT FILE

Speech Recognition Keyboard
Key Tronic
P.O. Box 14687
Spokane, WA 99214
(509) 928-8000
List Price: $1,495
Requires: 64K RAM, one disk drive.

CIRCLE 742 ON READER SERVICE CARD



The Speech Recognition Keyboard from Key Tronic.

ScratchPad with VoiceDrive Is Here

If God had meant for people to use keyboards, we all would have been born with 83 fingers. The keyboard is the frowning side of the Janus-like PC. While the glowing phosphor face of the monitor may be alluring, the keyboard is equally forbidding. Typists are already comfortable with the conventional part of the PC's keyboard, but the additional keys can turn anyone into a hunt-and-peck artist. And people who are unfamiliar with the mysteries of QWERTY keyboard layout are doomed to spend agonizing hours relearning the alphabet just to be able to communicate with the machine.

If computers were smart, you'd think they would learn to understand when you speak to them. Your dog, your parakeet, your pet planaria, even creatures as primitive as the neighbors' children can learn to recognize voice commands. Why can't something as intelligent and sophisticated as an IBM PC learn the nuances of the human voice?

The folks at SuperSoft believe that the PC can learn to be a good listener and the company offers a product to prove its contention—*ScratchPad* with *VoiceDrive*, the spreadsheet that you can talk to. What's even better is that, *ScratchPad* understands what you say. *ScratchPad* will even carry out your requests when you speak in a low, nonthreatening voice. You can enter numbers and commands, split the screen, calculate and recalculate, even turn voice control off—all without ever touching the keyboard.

ScratchPad* with *VoiceDrive
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List Price: $495; with Tecmar Voice Recognition Board, $995
Requires: 96K RAM, one disk drive, Tecmar Voice Recognition Board

CIRCLE 800 ON READER SERVICE CARD

ScratchPad as Spreadsheet

As intriguing as a product like this sounds, my first concern in looking at *ScratchPad* was to determine whether it was a mere gimmick or a product deserving serious attention. Although *VoiceDrive* may be amazing in today's keyboard-dependent world of personal computers, it would be worthless if the underlying software—in this case, the spreadsheet—were not a worthwhile tool. For *ScratchPad* to earn more than novelty status, the spreadsheet must be useful in commonly used applications.

Furthermore, as a spreadsheet, *ScratchPad* faces some stiff competition from other software packages. If it can even be considered as an alternative to the others battling it out in the crowded marketplace, it must be able to do some fancy footwork with rows and columns.

The first encouraging sign is that *ScratchPad* has been available since 1981 without voice command *(VoiceDrive)*, and it has survived against strong competition. Examined only on the basis of its number-crunching and analysis abilities, *ScratchPad* stacks up quite well. It certainly outshines the original, and now dinosaurlike, *VisiCalc*, but it pales before *1-2-3*. *ScratchPad* puts everything in black and white (or black and green). The middle ground between those two industry leaders is vast indeed, but *ScratchPad* lies near the upper end.

ScratchPad does not claim to be an integrated system like *1-2-3*, so you won't find any disk manipulation utilities. If you want to format a disk, give a call to DOS and let it handle the chore. Nor does *ScratchPad* offer charts, graphics, and other visual delights. Its screen is simple and command-driven—not a menu-masher. With no previous spreadsheet experience, you won't be able to jump in instantly and start analyzing Howard Hughes' will. But the commands and structure are so simple that using the spreadsheet will begin to make sense in about 30 minutes, and you'll feel competent in a day.

ScratchPad has been available since 1981 without voice command (VoiceDrive), and it has survived against strong competition.

ScratchPad lacked only a few features that I expect from current generation spreadsheets. For instance, many advanced spreadsheets allow individually variable column widths. Although *ScratchPad* lets you change the widths of columns of figures (in case you deal in more millions than the 10-digit default column width allows), if you want to change the width of one column, you must change them all. That omission might seem painful, particularly if you want to line a column with labels consisting of interminable names like, "Gross Profit Margin of Lint Recapture Subsidiary," but SuperSoft has solved the problem by



The *ScratchPad* with *VoiceDrive*, including the Tecmar Voice Recognition Board and Shure microphone.

designing *ScratchPad* to allow labels and captions (but not numbers) to stretch out for 40 columns with no need to reset anything. Formulas are limited to 35 characters.

ScratchPad also has features that other spreadsheets would do well to emulate. You don't have to unfold some massive 256-row × 128-column sheet to analyze a matrix the size of a game of tic-tac-toe. You can specify spreadsheet size from tiny to the borders of infinity, and *ScratchPad* will comply. The default setting is 53 × 255; the specified maximum limit is 25,000 cells (the product of the rows times the columns).

The amount of memory installed in your PC has no effect on maximum spreadsheet size as long as it meets the 96K RAM minimum requirement. (In fact, because *ScratchPad* is written using SuperSofts' own C language compiler, it won't deal with more than 128K RAM). If your imagination overreaches the memory available in your machine, *ScratchPad* marches on using virtual memory; that is, it swaps data to and from disk so your computer can function as if its available RAM were limited only by the amount of memory a disk will hold. Swapping data to and from disk takes much longer than fetching bytes from RAM, but *ScratchPad* speeds things up by allowing you to toggle the program so that it does not automatically recalculate every cell each time one is changed. Numbers are handled as binary coded decimals (precision permanently set to 13 digits, floating point, no matter what is displayed) rather than pure binary, so the strange rounding problems sometimes encountered in BASIC are minimized.

Although I am not qualified to judge how well *ScratchPad* stacks up against your favorite spreadsheet, it is genuinely workable and probably has enough power for anything short of analyzing the Swiss banking transactions of Latin American government officials.

His Master's Voice

Don't expect to slide the *ScratchPad* diskette into your PC and have it instantly turn its head like Nipper, the RCA dog, and listen for its master's voice. The program is built around a hardware interface. Currently, the PC version of the program works in conjunction with Tecmar's Voice Recognition Board. SuperSoft is modifying the program to work with Key Tronic's KB-5151 keyboard with voice recognition option, too.

The Tecmar card slides into any available expansion slot in IBM Personal Computers. The expansion card has a single miniature phone jack on its option retain-

ing bracket (the angled black piece of steel that holds the card in place). Plug the microphone in there. SuperSoft includes a cheap but workable mike with the combination package of *ScratchPad* and the Tecmar board, and either company will sell you a tiny, headset-mounted Shure microphone that sits inches from your lips. I also tried a professional-quality Electro-Voice RE-15 microphone. When I held it close to my face, I received good results, and mediocre results when it was more than 6 inches away from my mouth. Interfaces are available so that you can use a telephone to talk to your speadsheet.



You must train VoiceDrive to recognize and understand your voice speaking the specific words that will become the voice commands.

Hardware installation is as simple as installing any expansion card in your PC. Pull the lid off, plug it in, and hope for the best. I've never had a problem. If, like some people, you're as afraid to look at electronic viscera, have your dealer slide it in for you. That done, plug in the mike, adjust it for comfort (while keeping it close enough to your mouth so that you feel like your next word will make you chomp on it), and you're ready to start giving your computer—and yourself—voice lessons.

Teach Thyself

Before you can begin to use *VoiceDrive*, you must train it to recognize and understand your voice speaking the specific words that will become the voice commands. SuperSoft includes a simple, menu-driven training program with *ScratchPad*. Instruct it to train, and a 100-word vocabulary is flashed before your eyes, one word at a time. You can choose the number of iterations (how many times the training program runs through the 100-word sequence), but SuperSoft recommends three. When you're finished, you can save the data the program has gathered to disk so that you need not go through the roughly half-hour process every day. The training program also gives you the option to update any word at any time, in case recognition becomes doubtful or troublesome when running the spreadsheet.

About halfway through the training session, I began to have doubts about my sanity. There I was, monotonically repeating an obscure collection of words to a computer. I sat mesmerized, machine-like, intoning one word after another as they flashed on the screen. Images of rats in cages pressing bars for food pellets drifted before my eyes as the messages on the screen began to blur. Then it dawned on me—that's what I was doing—not only training the Tecmar card and *ScratchPad*, but training myself. I was learning how to pronounce words in the mechanical way necessary for the proper operation of *VoiceDrive*.

Operating the voice recognition board is a developed skill, like typing. You begin to realize how you can control all the subtle nuances to your voice. A subtle, even unconscious, change in the way you say things can confuse *VoiceDrive*. You may ask yourself, "Who's training whom?"

I had problems getting *ScratchPad* to recognize my utterances. But as I learned, and molded my voice, *ScratchPad* understood more of what I said. In a few hours, using my voice instead of the keyboard became second nature, and mistakes became increasingly rare. The program wasn't getting any better; I was learning to say things in exactly the same way, time and time again.

My worst problem was convincing *ScratchPad* to understand the Cancel command, and recognition of that became reliable after I retrained the program and myself a few times. Occasionally, what I said and what *ScratchPad* heard disagreed, but by saying *backspace* and trying again, the program and I were back in sync again. Even after several hours, however, I still felt tethered by the microphone cable. But then again, keyboard cables bother me too, and I could always invest in a wireless mike.

Clever Software Engineering

ScratchPad with *VoiceDrive* is more than just a voice recognition board connected to an already existing software package with voice commands substituted for keystrokes. The program has a sophisticated underlying structure that makes voice input faster and more error-free.

There are many good reasons why spoken language is difficult for computers to understand, and any attempt I might make at unraveling them would probably throw Noam Chomsky for a loop. Understanding normal speech, something most humans learn to do as infants, is impenetrable for personal computers. The English language boasts a vocabulary on the stratospheric side of 100,000 words, and most of those have multiple meanings. When you factor in by all the possible inflections, regional accents, nuances of compounds and word order, and other such nonsense, then shake everything into sentences, you end up needing so much memory to keep track of it all that a computer capable of handling it would leave

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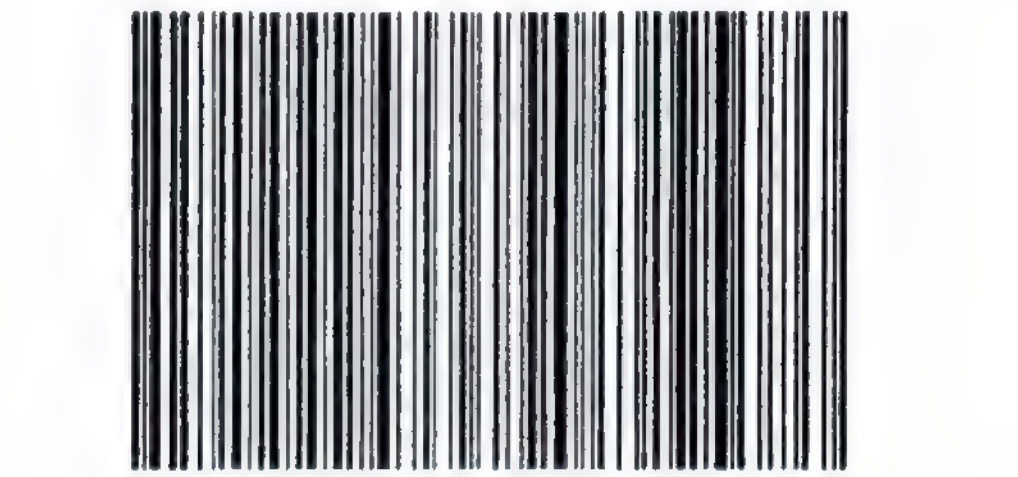
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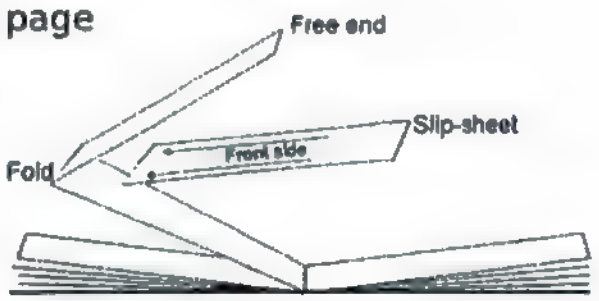
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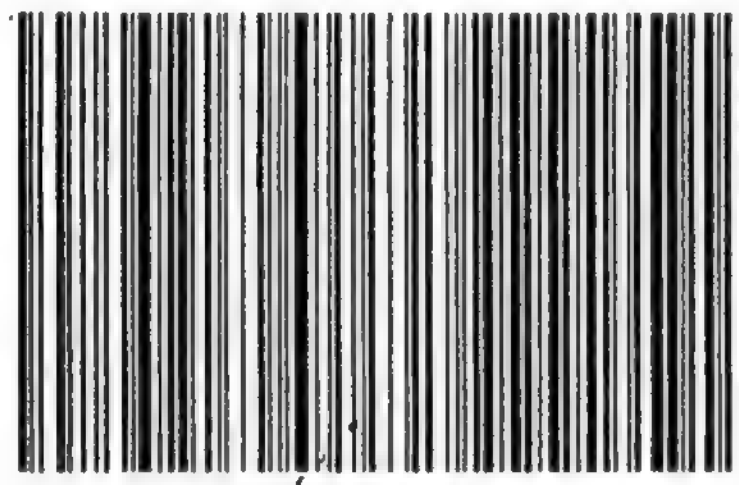
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Back

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No personal computer system can take apart even a simple sentence. Today's micros deal with isolated, single-word commands—and only few, at that. To keep things manageable, the Tecmar Voice Recognition Board is designed to understand only 100 words (200 with an add-on memory option). Left to itself, the Tecmar board hunts through its entire vocabulary for a match every time it hears something. Although computers are fast, analyzing words is a time-consuming task. Properly pouring through even the 100-word vocabulary makes the recognition process sluglike, taking several seconds for every utterance.

According to SuperSoft, such a strategy wastes time and causes mistakes. *VoiceDrive* uses a novel SuperSoft concept called vocabulary masking—the Voice Recognition Board is instructed to ignore groups of words in its vocabulary at certain times and react to them at others. Only a small fraction of the 100-word total vocabulary might be active at any given time. Fewer of the words in memory must be checked every time you say something, and there are fewer near-matches to confuse the program.

The mode the program is in determines which words are active at any given moment; that is, which words it expects to receive as input at any given time. Tell *ScratchPad* you want to enter a number, for instance, and the program has no need to listen for letters of the alphabet, file names, or further commands. Clever idea, no? Actually, it simply mimics part of the way people listen. Context can clue you in on what words mean, and on which words are likely to come next. Similarly, what you've already said tells *ScratchPad* what to expect.

Voice Technology Today

ScratchPad with *VoiceDrive* is not perfect. It's not error-free, and it can't pick out words from continuous speech or sort through even a single sentence. Some of its problems and limitations are hardware related; the current state of the art of voice recognition is not that advanced. *ScratchPad* pushes the current technology as far as it will go.



ScratchPad pushes the current technology as far as it will go.

What is more important is estimating the value of voice input to you. Even SuperSoft doesn't recommend using it for data entry. Spelling things out letter by letter and number by number is tedious whether you're talking to a machine or a scribe. (SuperSoft recommends you teach *ScratchPad* to recognize names for letters for greater accuracy. You can make any word correspond to any *ScratchPad* command.) The dictation of long strings of numbers is less accurate, slower, and more tedious than even hunt-and-peck typing.

Where *VoiceDrive* begins to glimmer is in its command mode. Saying a word is easier than typing it. It's also faster and probably no more error-prone (depending, of course, on how well you've trained yourself to type or talk to your computer). For analyzing a spreadsheet, rather than filling it, *ScratchPad* may be useful.

For spreadsheet applications, the concept of voice control is a gimmick. Freeing your fingers from the keyboard will run you about $500. And that freedom is of questionable value if you have a workstation rather than an office. You'll get strange looks every time you whisper a sweet nothing to your PC. Picture a dozen fledgling junior executives using this program in a bowling-alley-like open office: The cacophony would lead to chaos. Nonetheless, if you want to experiment with voice recognition, *ScratchPad* with *VoiceDrive* is a bargain. SuperSoft will sell you the programs with the Tecmar Voice Recognition Board for the price of the Board alone.

Although you might expect SuperSoft to fight tooth and nail to defend *ScratchPad* as a genuine leap in productivity, it won't. The company recognizes that the art is still young. But it also promises a new voice-controlled software product that will provide a genuine productivity increase—*WordPlus*, a word processor. No, it won't take dictation, but it will let stenographers edit a document without sending their fingers all over creation in search of the elusive command key. By uttering a few words, the stenographer can carry out elaborate editing commands without moving a finger from the home row of the keyboard. This means the stenographer can edit and type faster. Voice control begins to make sense in this context.

SuperSoft will also soon add a database manager with voice input, called *DEX*, to its product line. The three SuperSoft voice-controllable products will be integrated to work together and share files and data.

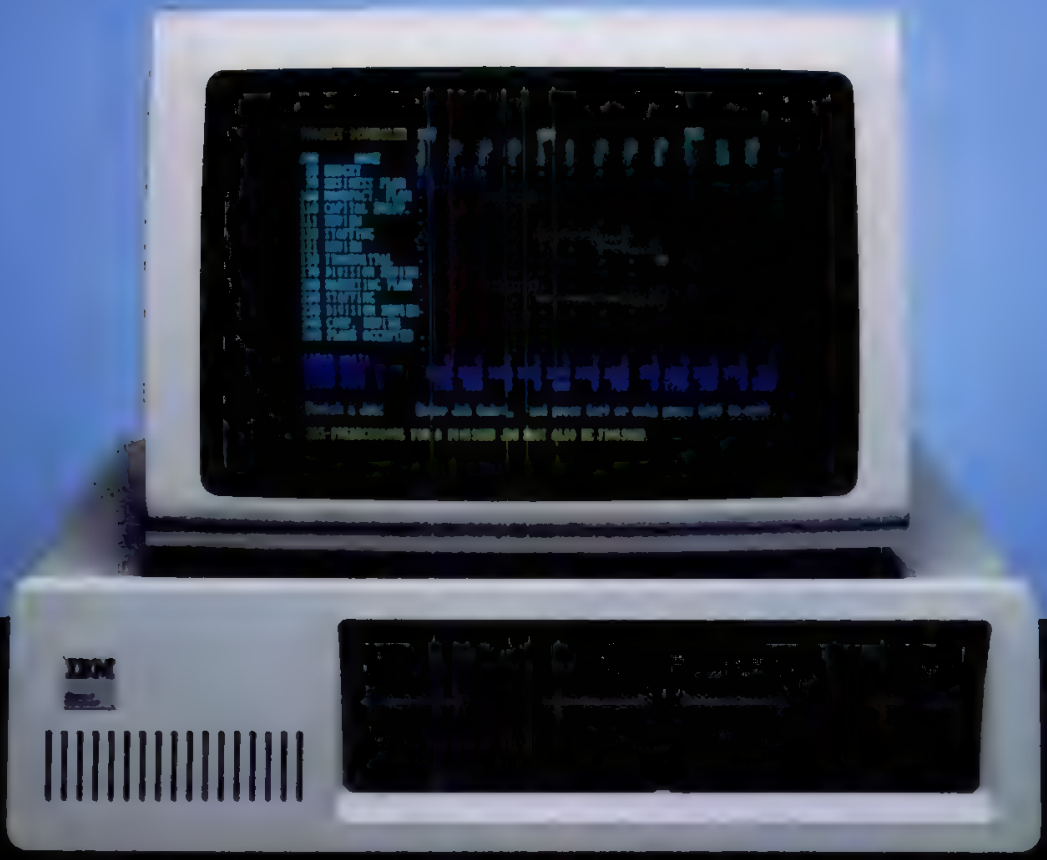
However, the true benefits of voice input still await systems designed for people who have their hands full or are otherwise unable to manhandle a keyboard. The potential benefits are great, particularly to people such as machine tool operators and the handicapped. Voice input systems hold great promise, and *ScratchPad* with *VoiceDrive* is helping open the door to putting the technology to work.

—Winn L. Rosch

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The Joy of Sticks

Computer games were the force behind some of the first alternate input devices. Today, games use three main types of controllers: joysticks, paddles, and trackballs. Somewhere there's a model that's right for your hand and your game.







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WIND: EAST
HEALTHY
HDG: NORTH
FAMISHED
PAW EMPTY
TIME: 9
HEAD TILT:

Joysticks

Many computer users are concerned about ergonomics — you know, straight-backed chair, no-glare screen, tilting monitor, low-profile keyboard—anything to prevent needless eye and muscle strain during those long hours spent at the PC. But who considers ergonomics when it comes to playing computer games? We computer gamers must take sore wrists and cramped thumbs for granted. And others have no pity for our plight; they accuse us of playing too much.

So long as there are new and exciting games to conquer, we dedicated gamers will keep on playing. But we don't have to put up with the strain of poorly designed game controllers any more. And if you've been suffering through your game's awkwardly using the keyboard for movement and other functions, it's time to give yourself a break.

To get a grip on what is available, the leading manufacturers of game controllers were asked to send samples of their products, and I put them to the acid test with a variety of different action games—mazes, shoot-'em-ups, races, and so on. I tried to find out which ones worked best and which ones caused the least physical pain. The following reviews consider the relative merits of different models of joysticks, paddles, and trackballs.

The joystick most often used today to control computer videogames and graphics utilities is a descendant of the four-directional steering levers used to control airplanes in the early days of flying. (The term *joystick* is British slang for this type of lever.) Actually, the computer joystick is directly linked to the ones created in the 1960s for radio-controlled model airplanes.

As personal computers developed, two distinctly different types of joysticks emerged for them: digital joysticks, used by Atari, Texas Instruments, and Commodore computers; and analog joysticks, used by IBM, Radio Shack, and Apple computers. The difference between the two lies not in what they do (both move objects around the screen and select items from menus), but in how they do it. Digital sticks generally contain four electrical switches beneath their base, one for each of the four cardinal compass points. When the stick is moved, it physically presses on a switch, making an electrical connection that signals the computer to move the object on the screen in that direction. The four switches provide for movement in eight directions; for instance, pointing the joystick northeast makes both the north and east switch connections.

Digital joysticks have fairly wide shafts to connect with a broad base to make contact with the switches. By contrast, analog sticks have much thinner shafts, generally smaller than the diameter of a pencil. Analog sticks do not rely on making physical connections with electrical switches. Instead, they attach to a ball-and-socket mechanism inside the housing. The socket



Photographs: Les Mersilio

The Computer Command Joystick from Wico.

is wired to a pair of potentiometers (devices that measure electromotive force by comparing incoming voltage against a known voltage). The potentiometers produce a double electrical signal, one for horizontal coordinates, the other for vertical coordinates.

Unfortunately, another difference between the two types of joysticks favors the digital design. Digital joysticks, like the standard Atari game machine controllers and those on arcade games, are all "self-centering," which means they return to a neutral center position when you let go, halting your character's movement on the screen. This characteristic is desirable for most home computer videogames. The analog joystick was originally designed without this self-centering feature, giving it a much more fluid 360-degree movement than digital models, which require little pressure to move the stick from one position to another. You may incur less wrist and hand fatigue this way, but you'll lose some degree of control over a fast-action videogame.

Better analog joysticks now contain a switch that locks the joystick in self-centering mode for games such as *Defender* and unlocks it for use with graphics programs. Analog sticks also have a feature not found on digital models—trim tabs for fine tuning the *X-Y* centering adjustments. If you use an analog stick, you must adjust the trim tabs to correct any off-centering drift. With some games this can be a blessing in disguise. For example, in a shoot-'em-up where the aliens are programmed to home in on a stationary target, you can make their task much more difficult by adjusting the tabs so that your character slowly drifts at all times, leaving you free to fire back.

To properly review a joystick it is important to convey not only the main features but also what each model feels like. Keep in mind that different hands may prefer different sticks. The correct choice can make your hands much more comfortable, and this shouldn't be ignored. Insist that you try out the joysticks in the store before buying one and bring your favorite software with you for the test. Think of it like this: You want to buy a nice-looking pair of gloves that fit comfortably and go with the clothes you already own—so, for the love of Pete, try them on.

Computer Command Joystick

Wico began as a manufacturer of control devices for arcade games, and its equipment has been used in more than 500 different coin-ops. Early on, Wico branched into the home market with replacement joysticks, paddles, and trackballs for the Atari videogame machines and others, leading to a similar line for Apple, Atari, Commodore, TRS-80, and, finally, IBM Personal Computers. Generally, its products are well designed and durable.

Wico's Computer Command Joystick for the IBM PC has the largest base and the tallest stick of any joystick I've seen. The base measures 4½ inches across by 4 inches deep by 2½ inches tall, and the shaft protrudes a full 4 inches above that. For comparison, the standard Atari joysticks protrude only 2½ inches. The shaft is tapered from the middle toward both ends, and the feel of the handle design is superb. Children can wrap their hands around it comfortably; adults can manipulate it easily using just three fingers.

The base sits on a flat surface so solidly that I can maneuver my way through the first board of *Pac-Man* without a hand to steady it, and it requires little effort to push the stick even in the self-centering mode. That's the advantage of a tall stick—it gives you more leverage. On the down side, the shaft sits somewhat loosely in its housing, leaving a bit too much "play,"



The TG Joystick from TG Products.

or distance the shaft must move to engage the potentiometers. In wide open spaces *(Defender, Asteroids, Missile Command)* this did not cause much problem. But when tricky navigation was required *(Lode Runner, Robotron 2084, Crossfire),* the Computer Command Joystick was not sensitive enough.

The two fire buttons made up for this a bit, at least in games where both buttons are used extensively for different functions—one to jump, say, the other to fire bullets. All analog sticks have carried two buttons for years, and they have been numbered, lettered, color-coded, and what have you, but both always feel identical and I still get them confused in the heat of battle. But not with this joystick. Button one is much larger than button two, making it easy to tell them apart while keeping your eyes on the screen.

This joystick has yet another advantage

over all the other analog models tested. The trim tabs are conveniently placed out of the way on the sides of the base and were made deliberately difficult to move. With other arrangements, I tend to knock the tabs out of alignment in the middle of a game. All in all, this is a very good stick for most gamers' needs, and is the best I've seen for children.

Kraft IBM Joystick

Although IBM seems to have an affinity for Kraft's joystick (the company uses it for demonstrations at trade shows and press events), I don't share it, even though the twin fire buttons are well separated—one on top of the base for the thumb, the other on the front side for the forefinger. As mentioned before, this is a great help in complex action games that make use of both buttons.

The box construction is square, 4 inches by 4 inches, which is good for stability on a table. Unfortunately, the plastic case is lighter than all the others I tested, and that means constant pressure must be applied with your button hand to keep the base steady. The stick, which is very slim, protrudes 2 inches from a depression in the top of the base, giving it a long throw. This improves accuracy, but decreases the speed with which you can take evasive action.

I didn't like the little knurled top on this joystick. It cramped my fingers during long play sessions. And the trim tabs got in my way and were difficult to adjust precisely. Still, this model's response was tighter than that of the Wico and TG sticks.

TG Joystick

The TG name has long been well known to Apple owners as a provider of one of the best joysticks and paddle sets available for that machine, and its PC joystick is much like its Apple predecessor. However, I don't think much of Apple joysticks, and my response to TG's PC offering was not overwhelming, either.

The unit is rectangular, measuring 5 inches wide by 3 inches deep by 2 inches high, and the stick itself protrudes only 1½ inches from the housing. This gives the TG stick a nice short throw for fast response, but the short shaft combines with its small handle grip near the top to cramp my hand after extended use. The short shaft complicates the problem of locating the easily moved trim tabs right on top of the housing, where they are just aching to get in your way at the worst possible time, throwing off the centering adjustments. The button that switches between self-centering and free modes is also located on top of the housing, too near the stick.

The twin action buttons, however, are like none other. Instead of using flat, concave buttons familiar from the arcades, TG designed push-buttons that stand more than half an inch above the housing. This makes the buttons easy to find when you have to watch the screen and allows you to comfortably rest your fingers on them in several different positions. They are stiff, offering more resistance than most action buttons, but their raised design more than makes up for that.

Data Spec Joystick

Although this unit does not have the raised button design (in fact, its two tiny buttons displeased me more than any others), it is a beefed-up version of the TG Joystick. The two units have almost identical measurements. But instead of a lightweight plastic housing, the Data Spec Joystick uses heavy metal construction for unsurpassed sturdiness and stability. And it even has rubber feet to prevent furniture scratches.

The color coded buttons are very small, low to the housing, and don't depress smoothly. And I have the familiar complaint of the two trim tabs being placed next to the joystick on top of the housing. Fortunately, the tabs on the Data Spec are stiff and difficult to adjust, making it harder to knock them out of alignment.

The stick itself is also worth mentioning. It is slim, rising 1½ inches above the housing, and gives a short, accurate throw requiring just the right amount of pressure. The notched metal surface of the knob on top of the stick is too small, but I discovered that it can be easily unscrewed from its mounting. Thus one can attach any ball, knob, or shaft extension with the same thread width. In fact, several forgotten items from the bottom of my tool box screwed right on and gave me a better grip.



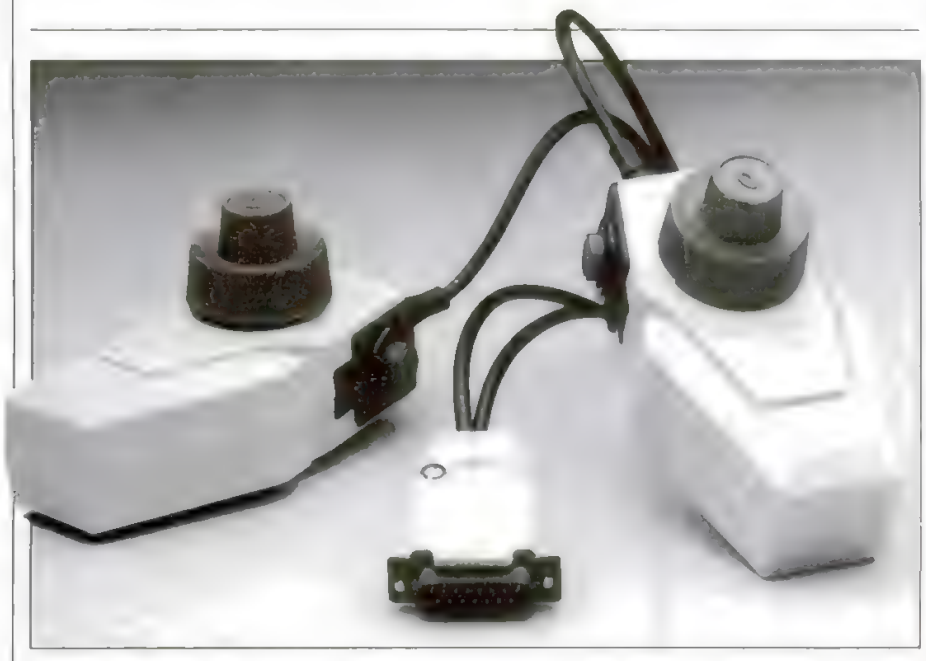
The Data Spec Joystick from Alliance Research.

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Paddle Controllers



The TG Paddles from TG Products.

Anyone who doesn't know what these are designed for has never played video pong, because *Pong*, Nolan Bushnell's famous coin-op, began the paddle fad and begat an arcadeful of imitations. In fact, this type of controller probably wouldn't even be called a paddle if it weren't for Bushnell's pioneering game.

The paddle is a simple affair, consisting of a single rotating knob and an action button. Generally, they are sold in pairs that attach with a single Y cable. However, paddles can not replace joysticks, and you won't find many games for the PC that use them. But paddles can enhance the operation of your own programs, and their simplicity and ease of use for children should not be overlooked.

TG Paddles

I hate to use the analogy for obvious reasons, but there is none better: These paddle controllers are shaped like miniature coffins, 4 inches long, 2 inches across the center and 1 inch on the ends. Strangely, their shape makes for a comfortable controller, though oriented only to right-handed people, and young children may not be able to wrap their hands around it. The unit is held in the left hand and the thumb just naturally falls directly on the fire button. The paddle knob itself is twisted with the fingers of the right hand.

The action buttons work well. The units are of durable plastic construction. And they have one endearing feature: The paddle knob is actually two knobs, a smaller one on top of the larger one, accommodating hands and fingers of all sizes. A nice touch.

Kraft IBM Paddles

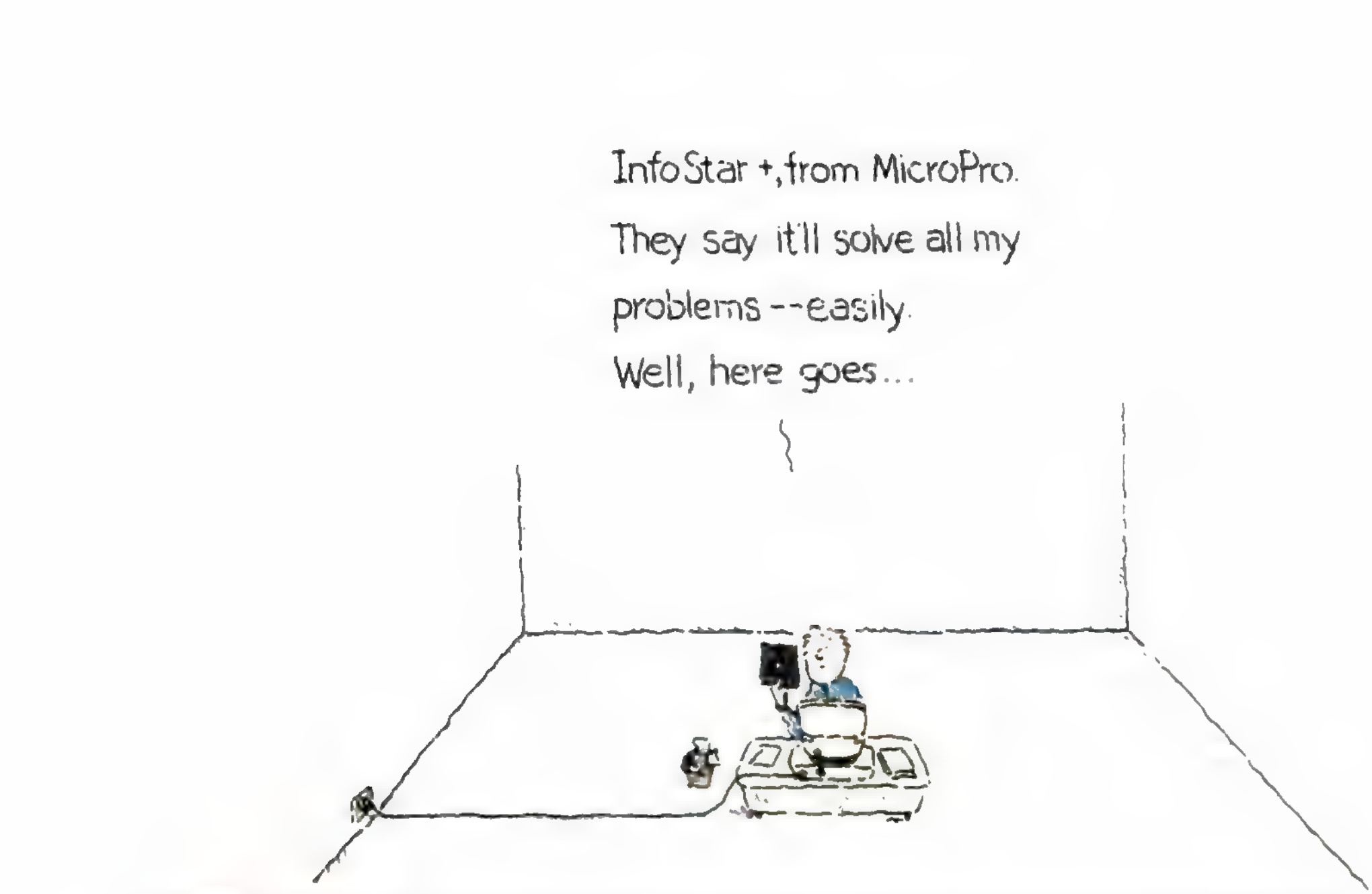
Like the base of Kraft's joystick, their paddle controller base is large and square, 4 inches on a side, and tilts toward the user, making it ideal for tabletop use. The fire button is square, and located in the upper left-hand corner, and it is extremely responsive. So is the paddle. It has a large lightweight plastic knob that turns easily. Children and those with smaller hands will appreciate this controller because you can grip the knob with your whole hand, just like on the original game of *Pong*.

Trackballs

The trackball is a concept that has not been developed to its full potential. Trackballs *are* designed to take the place of joysticks and emulate their functions and signals. You can use a trackball controller with almost any game that uses a joystick. My 2-year-old son uses a trackball to play games and with drawing programs he couldn't control with a joystick.

Trackballs consist of a large housing, through the top of which protrudes the top third of a billiard-sized ball. When you roll it forwards, your character moves up the screen; roll it left, and it moves left; and so on. The ball is attached to two wheels that relay signals to a pair of potentiometers, just like a joystick. But keep in mind that trackballs work best with games where movement is not restricted. Thus trackballs don't work too well with *Pac-Man*, but they're great with *Missile Command*

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The TG Trackball.

You can use a trackball controller with almost any game that uses a joystick.

and other shoot-'em-ups. And for young children's programs, they are essential.

TG Trackball

As of this writing, TG was the only company to ship a trackball for play testing, but you should know that one is coming soon from Wico. All I can say is that I hope it arrives soon because Wico's offering for the Atari and Commodore computers is the best there is, and we can only hope Wico's IBM PC trackball will be just as wonderful—because TG's isn't.

It is 6-by-5-by-2-inches, making it steady on a table. Oddly, it has three fire buttons, but only two of them seem to work with any of my games.

Unfortunately, the ball itself, which should spin freely enough to carry your character a short distance after you let go, seems to stick in its housing, which nullifies some of the trackball's effects and advantages. This stiffness really got to me after a few games of *Centipede*. Upon close examination, I do not believe I tested a faulty model. The construction is simply cheap and the entire thing feels very "plastic." I'm counting on Wico to keep the ball rolling. ■

PC FACT FILE

Address It Here

You can contact the manufacturers of your favorite devices at the addresses below.

JOYSTICKS

Computer Command Joystick
Wico Corporation, Consumer Division
6400 W. Gross Point Rd.
Niles, IL 60648
(800) 323-4014
(312) 647-7500 in Illinois
List Price: $49.95
Requires: analog controller card.

CIRCLE 711 ON READER SERVICE CARD

Kraft IBM Joystick
Kraft Systems, Inc.
450 W. California Ave.
Vista, CA 92083
(714) 724-7146
List Price: $64.95
Requires: analog controller card.

CIRCLE 712 ON READER SERVICE CARD

TG Joystick
TG Products, Inc.
1104 Summit Ave., #110
Plano, TX 75074
(214) 424-8568
List Price: $59.95
Requires: analog controller card.

CIRCLE 713 ON READER SERVICE CARD

Data Spec Joystick
Alliance Research Corporation
18215 Parthenia St.
Northridge, CA 91325
(816) 701-5848
List Price: $69.95
Requires: analog controller card.

CIRCLE 714 ON READER SERVICE CARD

PADDLE CONTROLLERS

TG Paddles
TG Products, Inc.
1104 Summit Ave. #110
Plano, TX 75074
(214) 424-8568
List Price: $39.95
Requires: analog controller card

CIRCLE 715 ON READER SERVICE CARD

Kraft IBM Paddles
Kraft Systems, Inc.
450 W. California Ave.
Vista, CA 92083
(714) 724-7146
List Price: $49.95
Requires: analog controller card

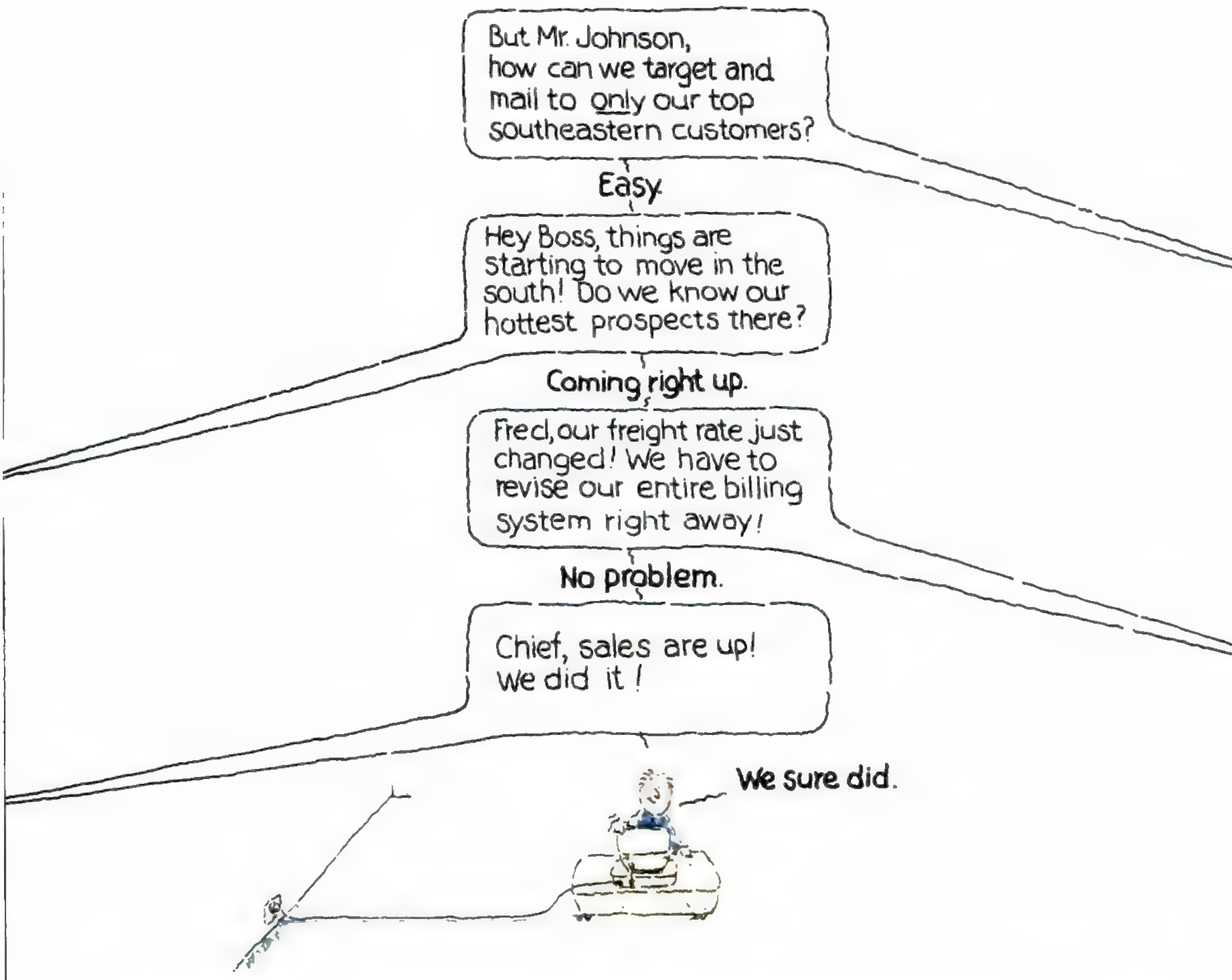
CIRCLE 716 ON READER SERVICE CARD

TRACKBALLS

TG Trackball
TG Products, Inc.
1104 Summit Ave. #110
Plano, TX 75074
(214) 424-8568
List Price: $59.95
Requires: analog controller card.

CIRCLE 717 ON READER SERVICE CARD

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For more information, write MicroPro, Dept. B, 33 San Pablo Ave., San Rafael, CA 94903.

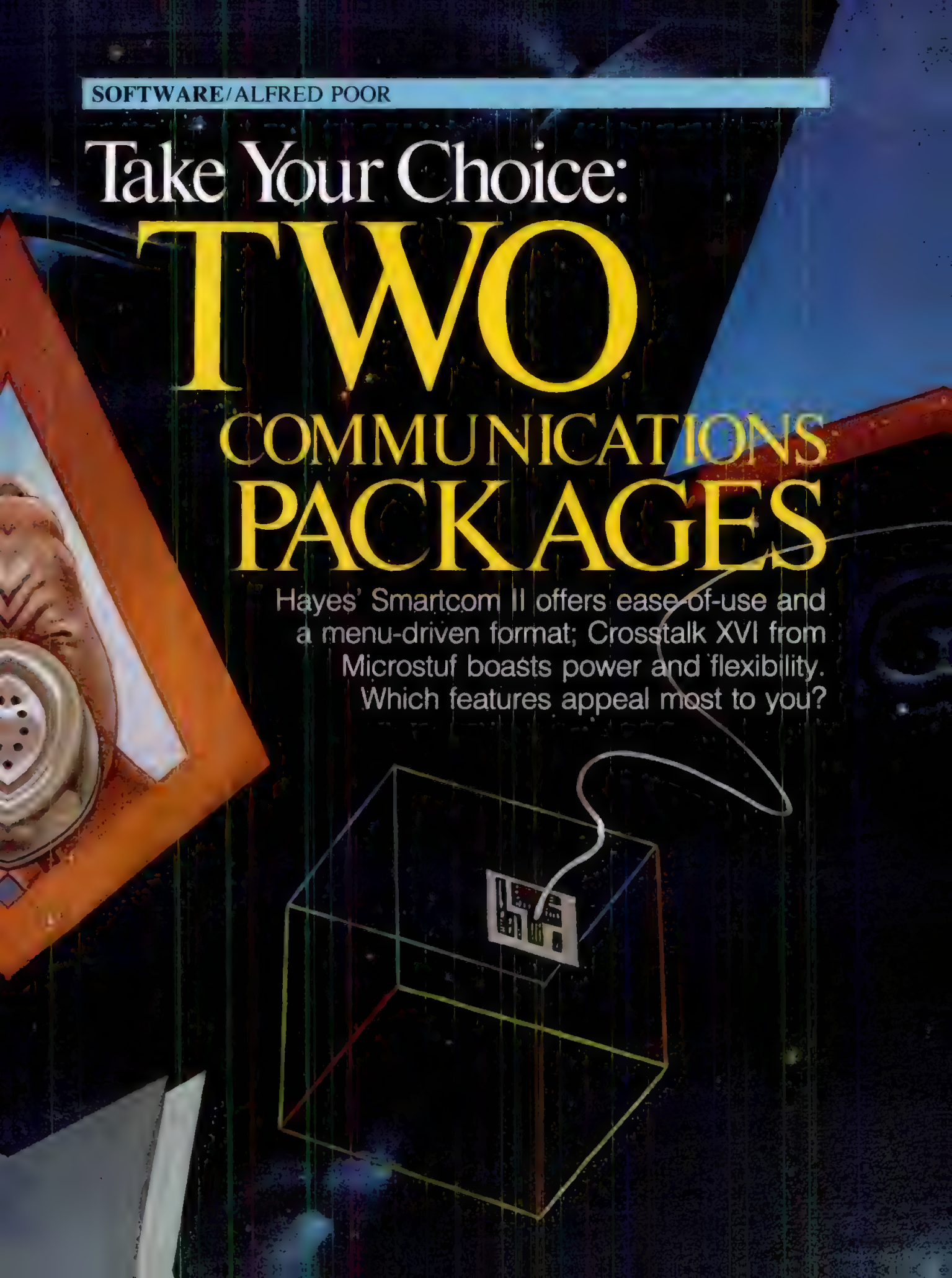
CIRCLE 231 ON READER SERVICE CARD



SOFTWARE/ALFRED POOR

Take Your Choice: TWO COMMUNICATIONS PACKAGES

Hayes' Smartcom II offers ease-of-use and a menu-driven format; Crosstalk XVI from Microstuf boasts power and flexibility. Which features appeal most to you?



Of all the possible uses for microcomputers, one captures the imagination of more people than any other: telecommunications. Perhaps it is the feeling of power you get knowing that, with just a phone call, you can get breaking news from the *New York Times* or Dow Jones. Perhaps it is the spirit of adventure that motivates you to seek out public bulletin board systems.

Whatever the reason, more and more users are plugging their computers into phone lines so they can talk to other computers. If you want to do the same, you will need at least two items.

First, you need a modem. The name is an abbreviation of the longer term, "MOdulator/DEModulator." The modulation process translates the digital signals from your computer's serial port into tones to be sent through the telephone lines. At the other end, another modem is required to turn those tones back into digital signals, which are then sent into the serial port of the receiving computer (the demodulating step).

In fact, the conversion process is achieved by taking a steady tone (the carrier tone) and changing its pitch. If the pitch is unchanged, it signifies a 0; if it is changed, it represents a 1. Thus, by sending a stream of high and low tones, the modem can send binary information.

Adding a modem to your computer is not enough, however. In the same way that a computer without a program is no more than an expensive decoration, a modem needs software to be useful.

Some modems have a limited amount of software built into their circuitry. For instance, some modems on the market



today dial numbers for you (using either pulse dial or touch-tone, as needed) or answer the line when another computer calls.

In order to be most useful, however, a modem should be able to take advantage of the features of the computer it is attached to. For example, if some airline flight information is displayed on your screen, you may want to print a hard copy of it. Or perhaps you have found some bibliographic information on a mainframe database that you want to save on your computer's disk so you can edit it later with your word processor.

These tasks require that you be able to send commands to your computer while your modem is active. These capabilities are possible with communications programs that make it easy to do the jobs mentioned above and a lot more.

I looked at two of the most popular communications packages for the IBM PC: Hayes' *Smartcom II*, and Microstuf's *Crosstalk XVI*. I tested them both on an IBM PC with 128K of memory, a monochrome display, and two floppy disk drives, using Hayes' Smartmodem 1200B. These programs provide an excellent selection of features to choose from and work with as you teach your computer to use the phone.

Hayes' Smartcom II

Hayes Microcomputer Products is best known for its modem product, the Smartmodem. It comes in two models, the 300 and the 1200, which differ in the speed at which they can send and receive data. They connect to your computer's serial port with an RS-232 cable. The 1200 also comes in a 1200B version, which is a card that plugs directly into one of the IBM PC slots so no serial port or cable is required.

Smartcom II is the PC communications program designed by Hayes to work with its modems. It is available as an option when you purchase the modem, or it may be bought separately.

You can get started quickly with *Smartcom II*. The program comes on a disk with no copy protection, and the manual directs you to start by making two copies of the disk: one to work with and one to serve as backup along with the original disk. Since the disk is not copy-protected, you can easily install *Smartcom II* on a hard disk system.

You start *Smartcom II* by placing the program disk in the default drive. (If your prompt shows A>, then the default is the A drive.) When you type SCOM and press the Enter key, the program will load and display the main menu.

Smartcom II is a menu-driven program with four major screens from which to choose. Figure 1 shows a chart of the program structure, including the two screens where text is entered or displayed. The best way to understand *Smartcom II* and how it works is to look at each of the four main screens in detail.

Main Menu Screen

The Main Menu screen is shown in Figure 2. The top third of the screen shows the menu selections. The three options

Smartcom II
Hayes Microcomputer Products
5923 Peachtree Industrial Blvd.
Norcross, GA 30092
(404) 441-1617
List Price: $149
Requires: 96K RAM, Hayes Smartmodem.

CIRCLE 796 ON READER SERVICE CARD

Crosstalk XVI
Microstuf, Inc.
1845 The Exchange, Suite 140
Atlanta, GA 30339
(404) 952-0267
List Price: $195
Requires: 96K RAM, modem.

CIRCLE 797 ON READER SERVICE CARD

Illustration: Cary Henrie

marked with asterisks are not applicable at this point—since the computer displaying the menu in Figure 2 is not connected with another computer, you cannot choose to send or receive files. In the same way, once a connection is established, the first option, Begin Communication, will be marked with an asterisk.

You select a command by typing the corresponding number. *Smartcom II* will respond by asking for additional information. For example, if you choose Begin Communication, you are asked if you want to Originate or Answer a call. These prompts are displayed on the four lines below the menu, and the first letter is capitalized and highlighted on the display. You make your selection by typing the appropriate letter.

Below the prompt area is a display space used to show disk directories and other lists. The two bottom lines are the status lines. The top one displays information about the current file, printer, and the Smartmodem. Once communication with another computer is established, the lower status line displays special key assignments, including default settings that are assigned to function keys. For example, the printer may be toggled on and off by pressing the F3 key while you are connected to another computer.

From the main menu, you may begin or end a communication connection session, change the default drive, turn the printer on and off, display the directory of the current disk drive, or do routine file maintenance. File maintenance includes the ability to display, print, rename, or erase a file on disk. Other options take you to other menu screens.

The Configuration Screen

The Configuration screen (Figure 3) allows you to define your computer system for *Smartcom II*. For example, you can define the type of printer interface you have and the letters of the available disk drives. You can also set default values for pulse or touch-tone dialing, which communications port you are using, and even how long you want the modem speaker to stay on while you are trying to make a connection.

You can also assign a default "communication set" on the Configuration screen. A communication set consists of the parameters and macros required to sign on to a given bulletin board, on-line service, database, or other computer system. Each communication set is assigned a letter of the alphabet, and 25 of them may be defined by you. (Set Z is the Standard Values set and may not be renamed or edited.) Hayes provides sample communication sets for four major on-line services (The Source, CompuServe, Dow Jones News/Retrieval Service, and The Knowledge Index), plus some public electronic bulletin boards.

By selecting one of the communication sets as your default set, *Smartcom II* will be ready to call up and sign on to the corresponding system when you first load the program.

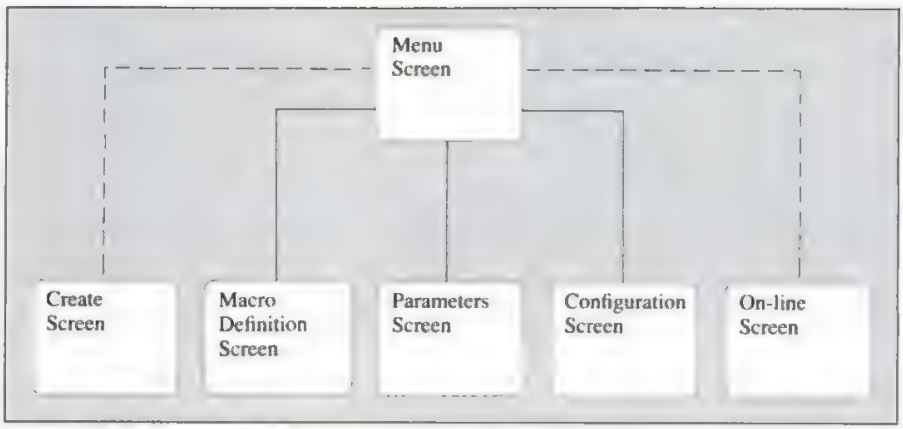


Figure 1: Smartcom II*'s program structure. The Create and On-line screens develop as you enter data or when data is received from a remote system.*

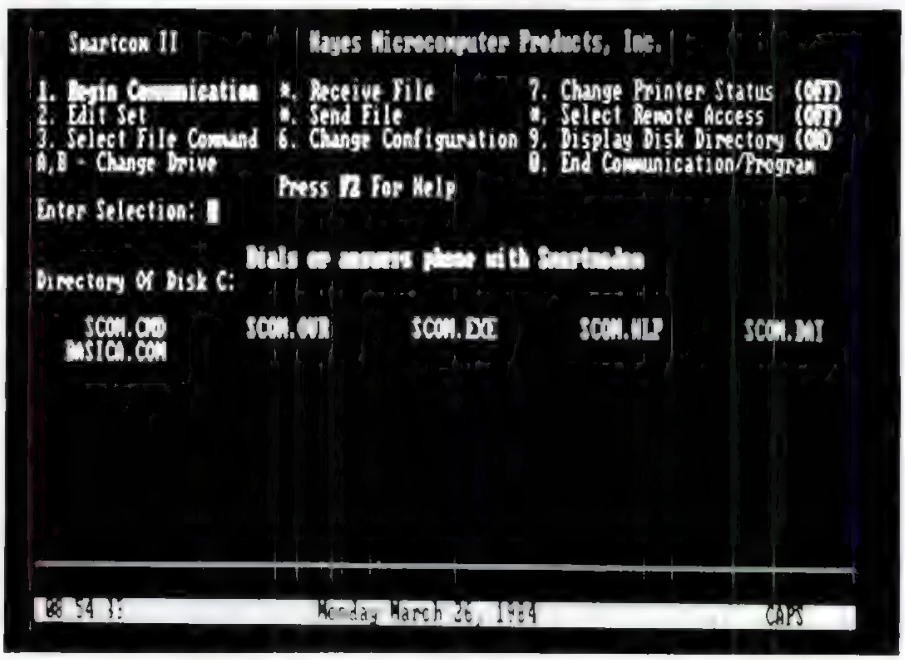


Figure 2: Smartcom II*'s Main Menu screen. The options marked with asterisks are not applicable at this stage.*

The Parameters Screen

When you choose the second option on the main menu, Edit Set, the prompt line will offer these options: Parameters, Macros, Reports, Copy, and Select Set. The directory space will display the letters and names of the communication sets that have been defined. To select the set you want to work with, type S, and *Smartcom II* will ask for the set's label. You respond to the prompt with the appropriate letter of the alphabet.

At this point in the process, you can examine or change the set's parameters. If you select the Edit Set option again and then choose the Parameters option, *Smartcom II* will display the Parameters screen (Figure 4).

This screen is used to describe the main factors that will govern connection between two computers. For example, you set the baud rate on this screen. The baud rate is the speed at which data is transmitted; most systems use either 300 or 1200 baud, or both. A speed of 300 baud corresponds to approximately 30 characters per second, and 1200 is about 120 characters per second. Modems that can transmit and receive at a faster rate may cost about twice as much as slower models. The extra cost for a faster modem can often be justified, however, because your connect time with an expensive timesharing service will be significantly shorter.

The extra cost for a faster modem can often be justified because your connect time will be significantly shorter.

Another important parameter is the character format. This parameter describes the pattern to be used in sending each character of data. Some of the pulses sent are bits of data, but these may be followed by "parity bits" that are used to check the errors, and there may be one or two "stop bits" used to signal the end of a character.

Character formats can be the most frustrating part of communications, but you can usually get the proper specifications from the host computer operators. Since different systems use different protocols, *Smartcom II*'s ability to make this infor-

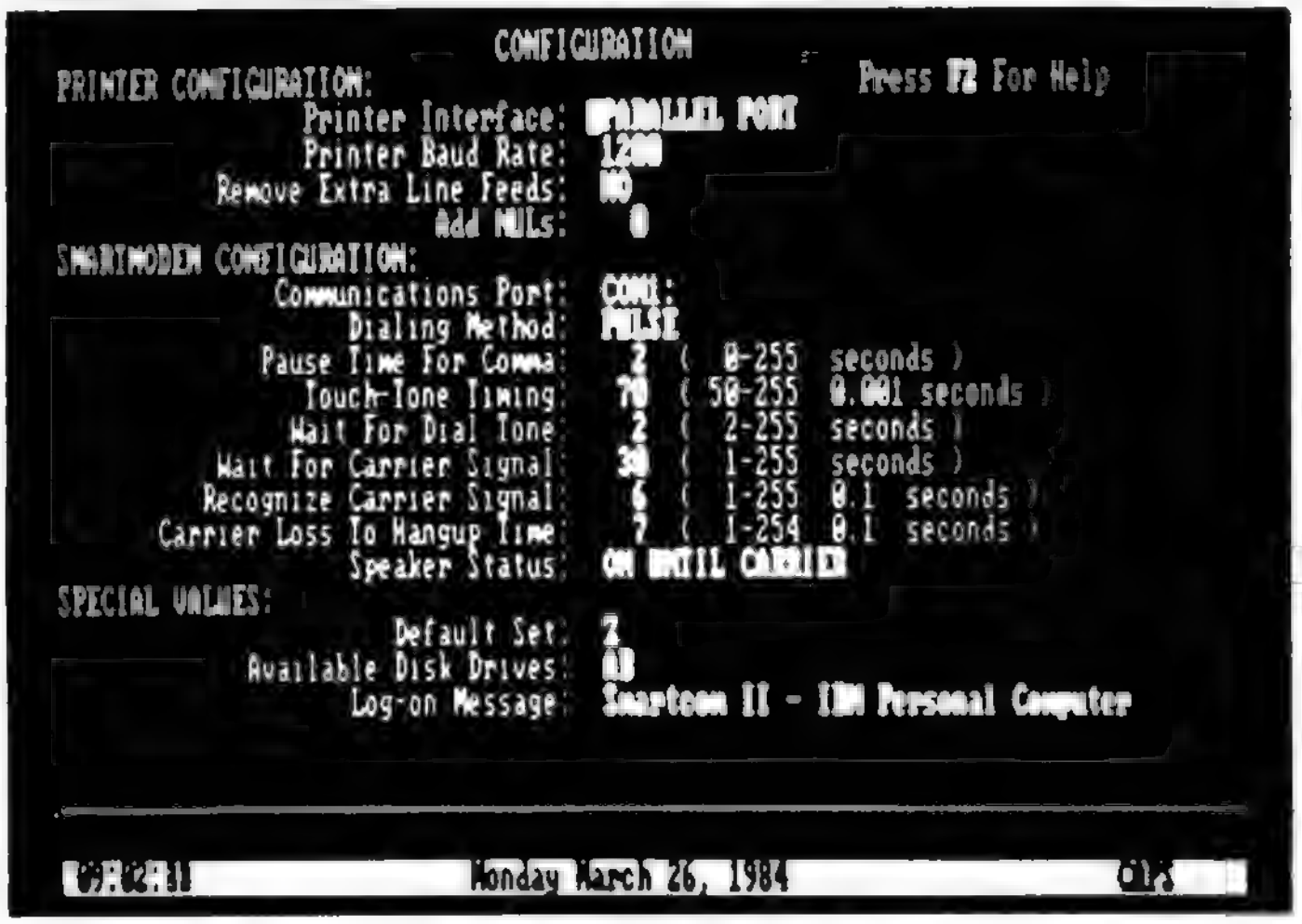


Figure 3: *The Configuration screen, on which you describe your computer system to* Smartcom II.

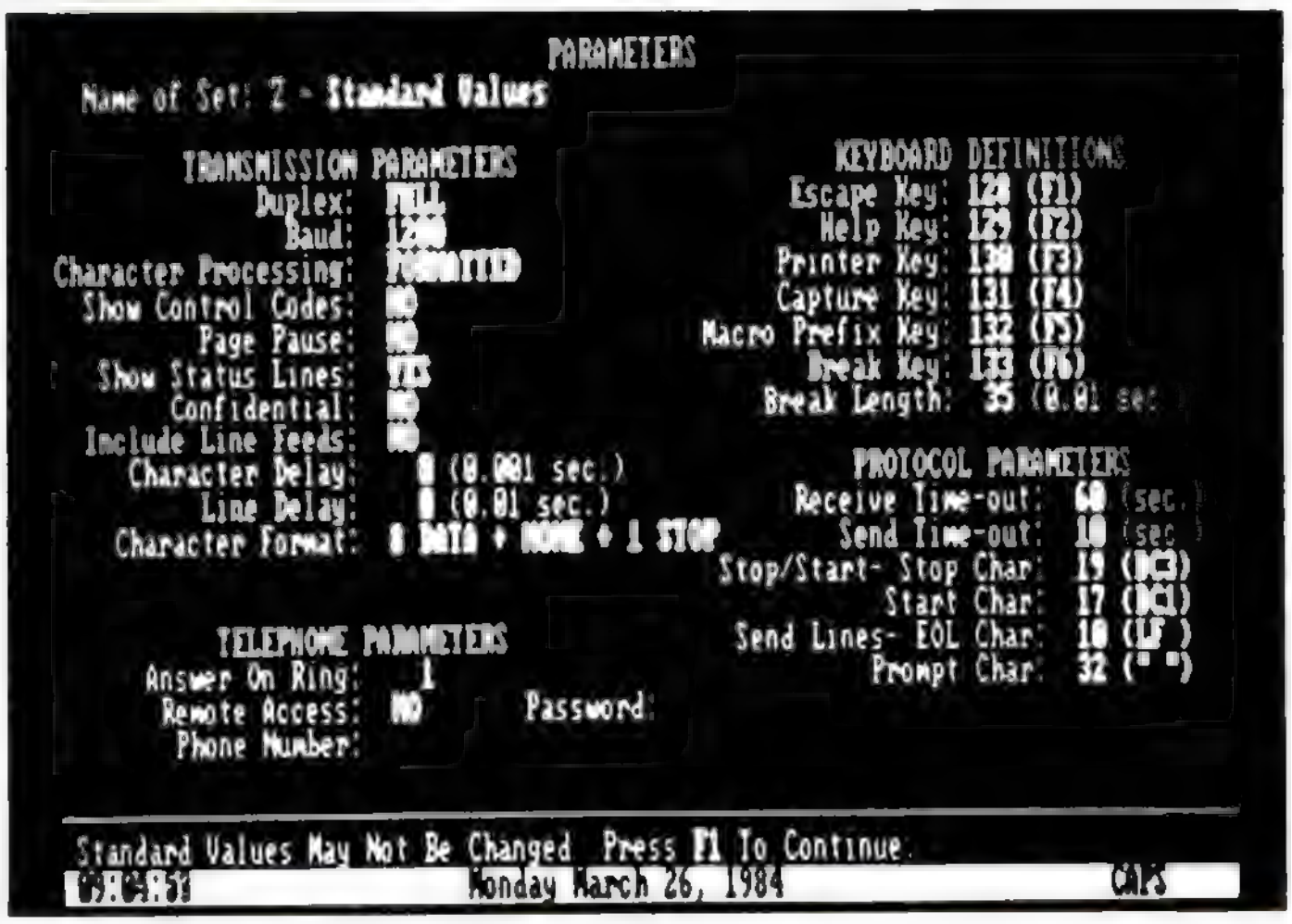


Figure 4: Smartcom II*'s Parameters screen. This set of parameters (Set Z) contains standard values that may not be changed.*

mation part of each communication set is a handy feature.

On the parameter screen, you can record the telephone number to call for access to an on-line service. This number will be dialed automatically if you have selected this set and choose to originate a call. You may also control the use of line feeds, the length of the break sent by the Break key, function key assignments, and other useful details. After making any changes to the communication set parameters, you are given the opportunity to save them on the disk.

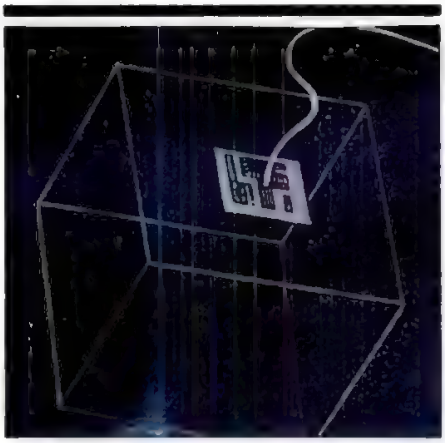
The Macro Definition Screen

If you select the Macro option after choosing Edit Set, the directory display area will fill with the 26 available macros. A macro is a way to send a series of keystrokes by pressing a single key. With *Smartcom II*, this power includes the ability to wait until a certain character is received from the other computer before responding with the next batch of characters. For instance, you can define a macro so it will send your name when it receives the colon (:) at the end of the "Member name:" prompt sent by an on-line service. This makes it possible to automate access to on-line systems, so you do not have to remember menu commands or repeat lengthy command sequences.

The macro labeled Z in each communication set is reserved for this automatic log-on sequence and is called automatically when you use that set to make a connection. The Z macro can be used to enter system names, user account numbers, passwords, and any other data that you enter routinely when signing on to that service. This makes it much simpler to connect with your favorite services.

If you select a macro that has not yet been defined, the Macro Definition screen will appear. It shows which macro you are working with and the name of the communication set that it is part of. You can define how long *Smartcom II* should wait before executing the next part of the macro, and the character it should wait for before sending the data. You may also specify whether or not a carriage return is to be sent along with the data.

Smartcom II includes sample macros in the sample communication sets for the on-line information utilities. For example, The Source communication set includes macros that give you easy access to many of the most popular features on the system. You may use these as models when you design your own macros.



Smartcom II's macros make it possible to automate access to on-line systems.

Making the Connection

To make a call from the main menu, select the Begin Communication option from the main menu, and you will be asked if you are originating or answering. Type O for originate. If you have already selected a communication set with a phone number defined on the parameter screen, *Smartcom II* will dial the number and execute the automatic log-on macro (if it is defined). If there is no number on the Parameter screen, as is the case with the Z or standard communication set, you will be prompted to enter the number.

The screen will keep you posted on the call's progress, and depending on the setting on the Configuration screen, you will also be able to hear the progress through the modem speaker. Once you have made the connection, the display will switch to the On-line screen, and you will be able to send and receive data. At the bottom of the screen, the status lines will show file and printer status, as well as the definitions of the active function keys.

While you are connected to another system, all the data that is displayed on the screen is stored in a portion of memory called a buffer. One important dividend of this feature is that it allows you to review data that has already scrolled off the screen. You may use the PgUp and PgDn keys to move one screen-full at a time, and the up and down arrow keys to move a single line at a time. The Home and End keys take you directly to the beginning and end of the buffer. The size of the buffer depends on the amount of memory installed in your computer.

File Transfer

The most important function of communications software, besides making computer communication easier, is the control of information exchange between computers. With the ability to send and receive files, a computer becomes much more than a simple terminal.

Smartcom II has an entire section of its features devoted to file transfer. It also has a simple method that permits you to save information as it comes in on the screen so you can record it in a text file on your disk. It is also possible to save the information that is in the buffer. This means that you can store information that has already scrolled off the top of the screen.

The file transfer options allow you to both send and receive files. There are standard facilities that allow your computer to signal the other computer when to stop and resume sending data. *Smartcom II* can handle both text files and program files (object files stored in binary format rather than in standard text format).

For program file transfers, you want to

be certain that every bit of data is transferred correctly, and *Smartcom II* provides an error-checking protocol for this. It will only work with computers running *Smartcom II*, the Hayes Terminal Program, or other programs that use the Hayes protocol, such as M.I.T.E. from Mycroft Labs.

Other Smartcom Perks

Smartcom II has a number of other interesting features that deserve comment. The Remote Access feature lets you set up your computer to accept calls and transfer files without your help by permitting other computers to call your computer, which will automatically answer the call. You may include a password requirement to limit access to the system. All file transfers under Remote Access are made using the error-checking protocol and may only be used by the programs that use that protocol.

You may also create your own text files while you are using *Smartcom II*. With this feature, you can prepare electronic mail while off-line and then send your message after you make the connection by transferring the file. Since the computer "types" faster than you do, this can cut down on expensive connect time. (The file creation option offers limited text-editing capabilities, but it is no substitute for a word processing program.)

You can print reports describing the communication sets, which gives you a written copy of the parameters and macro definitions. You can copy one communication set to another and then modify it to provide access to another system. You can switch from one set to another while on-line, and thus are not limited to just 25 macros for a given application.

Another important feature is the consistent use of the F2 key as a Help key. This feature is clearly displayed on all screens. Depending on the situation, pressing this key will display anywhere from a few lines to an entire screen of detailed information. The information responds precisely to the operation in effect when the Help key is pressed. If you have the cursor on the Baud Rate entry on the Parameters screen and you press F2, you will see a pair of paragraphs explaining that parameter.

The manual itself deserves special note. It contains detailed instructions on how to sign up with and then log onto the four database services listed earlier. Since many people who buy this package will use it for one or more of these services, this section is a big help. It provides the user with a "cookbook" set of instructions that should make setup and use of these services much easier.

The manual also covers switch settings for the correct installation of a modem. It has a 20-page chapter devoted to the technical basics of modem operation and data transfer. It includes phone numbers for Telenet, Tymnet, and CompuServe (the major computer access networks), with spaces so that you may write down the local numbers for your location. It even lists eight pages of electronic bulletin board systems to get you started on exploring grassroots telecommunications.

Smartcom II is a powerful program that is fairly easy to get started. One problem I ran into was that I couldn't find the way to end a communication session. I was able to get to the main screen, but misinterpreted the last main menu option, End Communication/Program. At first I thought that I would exit the program if I made that selection. As it turns out, this command does one of two things, depending whether or not you are connected. If you are on-line, it disconnects you from the phone line but leaves you in *Smartcom II*. If you are *not* on-line and select this command, you exit the program and return to DOS. This is a minor problem, but it's confusing nonetheless.

The macro tables are also a little difficult to work with at first. You may enter the "prompt" characters as either the character itself or its ASCII decimal equivalent. You may also use the arrow keys to scroll through the different characters. The manual does give a good example of how you can take a printout of a log-on sequence and use it as a guideline when creating a log-on macro.

The manual is attractively designed with two-color printing, many screen illustrations, and a clean, typset layout. The type is rather small, and the informa-



Smartcom II's error-checking protocol will only work with computers running programs that use the Hayes protocol.

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CIRCLE 294 ON READER SERVICE CARD

tion is rather dense. There is no index, and tabbed dividers are used only between groups of chapters, so finding a specific piece of information can be a chore at times.

Perhaps the most serious complaint about the manual is the way it is organized. For example, I don't think that it is necessary to make the second chapter a detailed course in telecommunications. On the fifth page, the text explains that the letter A is expressed in binary format as 01000001 and B is 01000011. It then goes on to show graphs and explain the difference between amplitude modulation, frequency modulation, and phase modulation of sine waves. Later in the chapter it explains the terms "half-duplex" and "full-duplex." Then it says that those definitions are not the meanings generally used when discussing computer communications. Instead, what most people call "half-duplex" is in fact "no echoplex."

I enjoy technical details, but not everyone does. The manual recommends that you read this chapter before operating the program. Many nontechnical users might throw up their hands in despair after trying to wade through this information. Perhaps it would serve just as well if this chapter were relegated to a reference appendix at the end of the book.

Crosstalk XVI

Crosstalk XVI is the latest version of the popular *Crosstalk* program that runs on CP/M computers. This new version has been completely reworked to take advantage of the additional power available in 16-bit computers like the IBM PC, hence the "XVI" in its title.

Like the *Smartcom II* package, getting started with *Crosstalk XVI* is easy. The disk is not copy-protected, and the manual suggests that you make two copies of the program disk. To begin the program, you simply type XTALK and press the Return key, and the program will load the title screen and then switch to the Status screen (Figure 5).

Where *Smartcom II* is menu-oriented, *Crosstalk XVI* is a command-oriented program. You can enter any one of more than 50 commands (or their two-letter mnemonic abbreviations). This gives you immediate access to all the configuration and parameter values.

The most significant values are displayed on the Status screen. The top half of the screen shows the settings of different features, grouped by category. Under the "Communications parameters" heading, you will see the values for SPeed, PArity, DUplex, and others. To set the baud rate to 1200, you type "SP 1200" when the command? prompt appears on the bottom line. The value will then be displayed. If you specify a speed that is not permitted, you will receive an error message that explains what you did wrong. If you need help with a command, enter the letters for the command followed by a question mark—as in SP ?—and *Crosstalk XVI* will display a help message that explains the command.

From the Status screen, you may specify all the important factors, including the phone number to be dialed. Type the command GO, and the number will be dialed. Once the connection is made, the display will switch to the terminal mode screen. At the bottom of this screen, you will see a prompt that tells you which key to press for "attention" or to "switch," as well as the capture status (on or off) and the time since the connection was made.

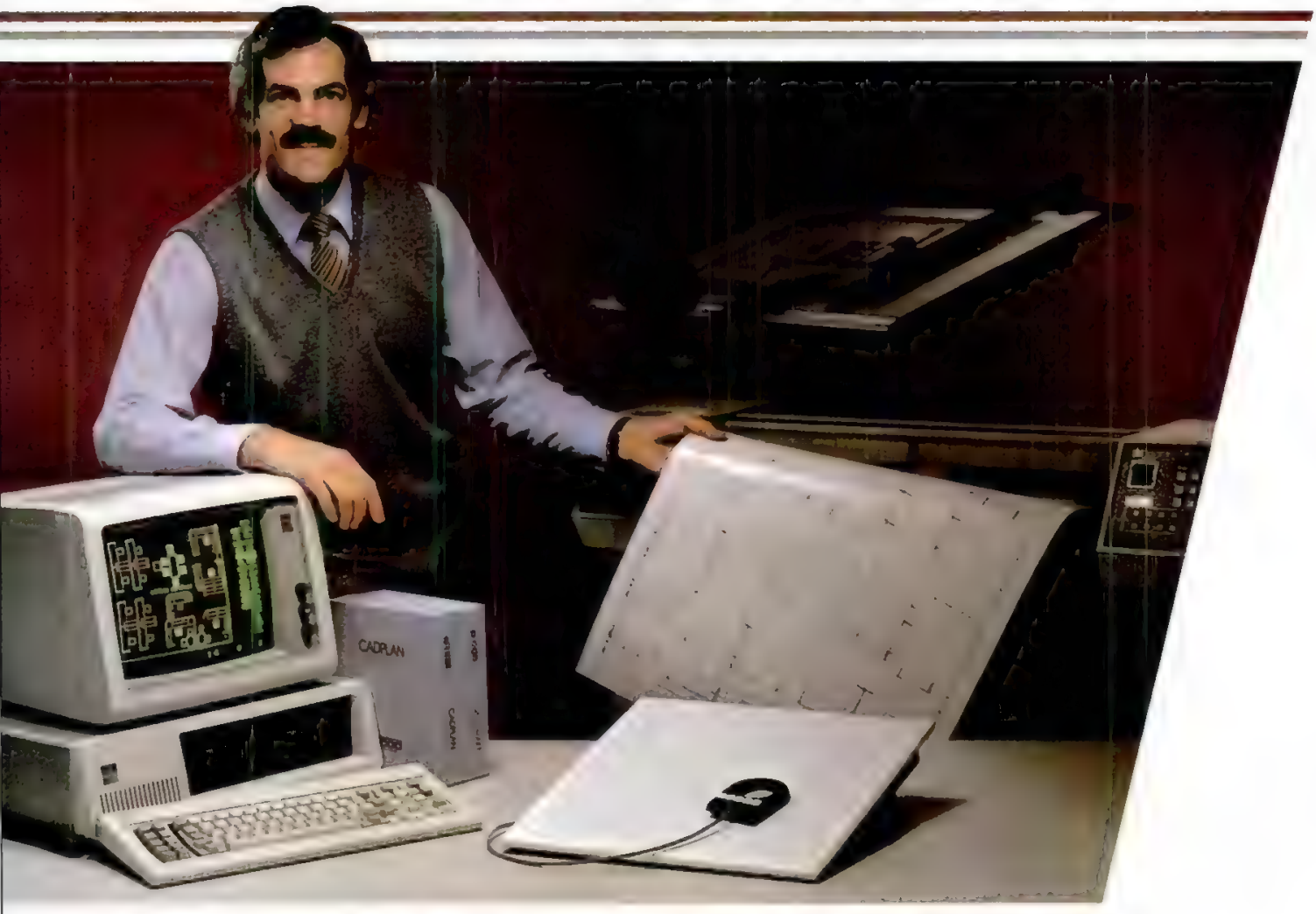
The attention key is initially set to the Esc key. This signals *Crosstalk XVI* that you wish to interrupt the sending of data to the other computer in order to issue a command. You might want to turn the printer on, for instance, or start saving the information to disk. After you issue the command, you will return to the terminal mode. The Home key is set up as the switch key, which allows you to switch back and forth between the Status screen and the Terminal Mode screen. Note that you may change these key assignments at any time with just a single command.

Crosstalk XVI has a screen buffer that allows you to save text that has gone past, but it does not allow you to bring it back to the screen. When receiving data, you may either capture it in memory to store in a disk file later, or you may choose to go



Figure 5: Crosstalk XVI*'s Status screen.*

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CIRCLE 523 ON READER SERVICE CARD

direct to disk. A machine with 128K can capture about 66K of data when saving to memory. Going direct to disk allows the files to be longer, but the transfer can take longer. The manual provides some good guidelines on choosing the most appropriate method.

This program also offers verification protocols for file transfers. In fact, you may select from two different protocols. The first is the Crosstalk protocol, which is compatible with all other versions of *Crosstalk*, including the CP/M versions. The other protocol is XMODEM, which is one of the most popular public domain communications packages (see "XMODEM: A Standard Is Born," *PC*, Volume 3 Number 7). Together, these two methods give you a good chance of being able to run a verified file transfer with almost any kind of microcomputer.

Crosstalk XVI's main advantage is that it allows you to fully automate almost any communication procedure.

Command and Script Files

Crosstalk XVI's main advantage is that it allows you to fully automate almost any communication procedure. This is done through the use of command and script files.

A command file lets you load all the different parameters required for communicating with a given on-line system. You simply create a text file with the extension .XTK and list in it all the commands you require. You can specify the name and phone number of the service, the baud rate, the character data format, and even specify whether the printer or save to disk should be on or off. If the last command is a GO command, the program will automatically place the call for you, and you can even tell it how often to keep trying if it gets a busy tone.

```
.       Crosstalk script file to guide new user through making a call

sc s
clear
message
In  order  to make a call,  CROSSTALK must first know  several  things
For example,  you must first tell the program what the phone number is,
and what modem speed you wish to use to make the call

This  script  file will guide you through all of the steps necessary to
help you make a call with CROSSTALK
ask Press ENTER to continue:
clear
message
The  first  thing  CROSSTALK  needs to know is the phone  number  to  be
dialed   The phone  number may be up to 36 characters long     Note that
some modems do NOT allow spaces and dashes between the digits of a phone
number, others do
Number
clear
message
If  you wish,   CROSSTALK will display the name of the location you  are
calling at  the  top  of  the status screen    It is  not  necessary  to
enter  this information if you don't want to
Name
clear
message
The  next thing CROSSTALK needs to know is the modem speed you  wish  to
use.  If you have a 300 baud modem,   your only choices are 110 and 300
If  you have a 1200 baud modem,   your choices are 110,  300,  and  1200
baud   Note that 110 is entered as 0110 to distinguish it from 1200
Speed
clear
message
You  have now entered all of the essential information to place a  call
If  you   wish,   CROSSTALK   can   save  this  information  for  future
reference  in  a "command file".    You may recall the command file at a
later time to place  a call to this particular system.
ask Do you want to save this setup in a command file?
if -Y skip 1
save
ask To begin the call, enter "GO" at the command prompt  Press Enter
to -
```

Figure 6: *The NEWUSER.XTS file. This is a script file that is included on* Crosstalk XVI*'s program disk.*

The function key definition commands are particularly helpful when using command files, although they may be used at any time. These commands let you define the character strings that are sent when you press a function key. You can also define the function keys in combination with the Shift or Alt keys. Thus, you may define up to 30 macro keys per command file.

Script files work along with command files to provide total automation. In effect, you may use any of the regular commands, along with about 20 more that are used to control the flow of the command execution. A perfect example of a script file is included on the program disk, entitled NEWUSER.XTS (Figure 6). This file, when executed, prompts you for the number, name, and speed for the service you wish to call. It then gives you the opportunity to save the information in a command file for future use.

Other script files are included on the program disk, including one that guides you through setting the configuration defaults. The script file feature is in fact a job control programming language, with few limits on its capabilities. For example, you could easily write a script to wait until 11:30 at night (when the phone rates are cheaper), call another computer and log on, download and save a number of files, send back another set of files and delete them off the disk, end the connection, and wait for other computers to call in, screening them with multiple passwords and offering menus and branching options for

the transfer of different files.

Note that *Crosstalk XVI* does not give you any way to create command or script files. You must exit the program and use EDLIN or some other text editor to create and modify these files.

To Top It Off

Crosstalk XVI supports remote operation, allowing other computers to call in to exchange files. It provides several terminal emulation options, including an IBM 3101 ASCII terminal, a Televideo 910/920, a DEC VT-100, and a DEC VT-52. The program supports both monochrome and color displays and lets you specify the color combinations to be used for a color display.

It is not possible to do justice to the range of available commands, but it is worth noting that it is possible to change the subdirectory under DOS 2.0 with a CD command. It is also worth noting that while you can do most file management applications from within *Crosstalk XVI*, it is possible to leave the program and return to DOS, then run the program again, and not lose the connection.

The manual is typeset and makes good use of color. It avoids detailed technical discussions, but does provide some information about how to configure your modem and interface. There is a good index, and the information is organized in a way that makes it easy to read and fairly easy to find. The package I received also contained a discount membership offer for DELPHI, the on-line information service offered by General Videotext. This is one of the newcomers to the field and deserves a good look if you are thinking of signing up with The Source or CompuServe.

One final note about *Crosstalk XVI;* it is one of the first serious programs that manages to inject a light and friendly touch without getting cute. When you load the program, the title screen informs you that you may press the space bar to skip the opening title. If you wait a moment, you will then see a brief quote appear at the bottom of the screen. The catch is that next time you start the program, don't be surprised to find that the quote has changed! The sayings range from thought-provoking to downright funny, and all the ones I saw were appropriate and worthwhile. If you don't agree, press the space bar and skip it. Microstuf deserves a tip of the hat, however, for making an effort to brighten our days.



If you want to automate complex communications procedures or exchange files with other Crosstalk- or XMODEM-equipped computers, Crosstalk XVI is the program of choice.

One Way or Another

Of these two communications programs, which one should you choose?

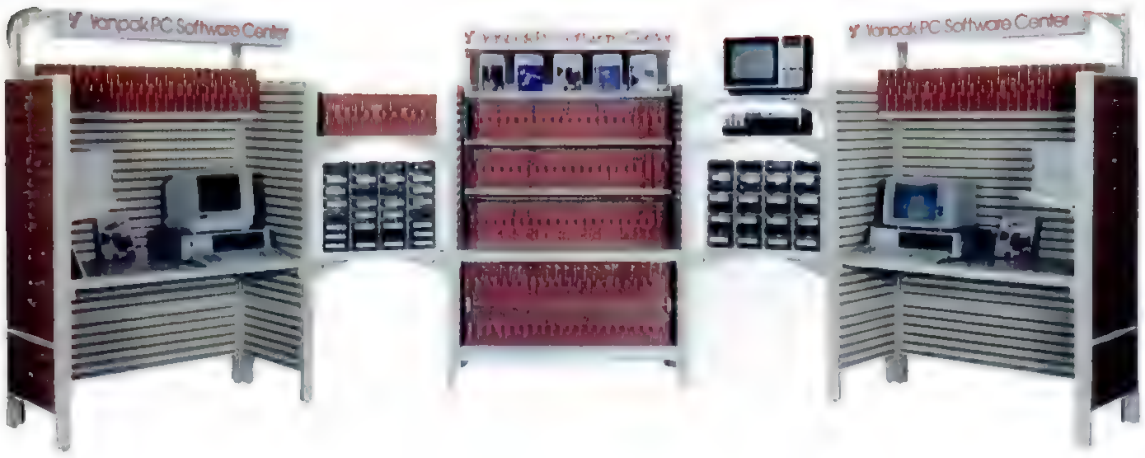
Smartcom II does not have nearly as much power as *Crosstalk XVI*. However, it is fairly simple to set up and get running, in spite of the manual. Casual users of information services may appreciate the screen buffer, which will let them review items that have already gone off the screen. The macros have a great deal of flexibility, but they can only recognize single-character prompts during an automatic log-on sequence. The file transfer system offers an error-checking protocol, but it works only with files sent to and from other Hayes systems.

Crosstalk XVI is even easier to use than *Smartcom II* in many ways, since it comes with the script files that automate the configuration and call-placing processes. It may be a bit expensive, however, if that is all you use it for. For file transfers however, *Crosstalk XVI*'s protocols are likely to make a broader range of transfers possible, and its terminal emulation features can be essential in some applications. Its strongest feature, however, is that you can have a virtually unlimited number of scripts to automate file-transfer procedures. By setting up an AUTOEXEC.BAT file, you could create a disk that would allow an untrained person to complete a complex transfer task simply by turning the computer on.

Crosstalk XVI feels like one of those great programs where it takes almost no time to get it doing something useful, but it also has such depth that you have to spend a long time working with it to push it to its limits.

So if you have a Hayes modem and are going to be using the program for more casual work, or will be exchanging files with other computers running Hayes programs, I recommend buying *Smartcom II*. If you have a different type of modem or plan to get involved in remote access for file transfers, or if you want to automate complex communications procedures or exchange files with other Crosstalk- or XMODEM-equipped computers, I think *Crosstalk XVI* is the program of choice. ■

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Falmouth, MA 02540

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Alexandria, VA 22304

CESA of America, Inc.
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Video Tech Software
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East Lansing, MI 48823

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Southgate, MI 48195

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San Francisco, CA 94109

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San Jose, CA 95129

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SoftServe, Inc.
1047 W Foothill Blvd
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Idea Systems, Inc.
21016 Devonshire Street
Chatsworth, CA 91311

PC Whatever
35201 Newark Blvd., #2
Newark, CA 94560

Travel Center
1241 Howard
Burlingame, CA 94010

Hunter Research
6801 Dublin Blvd
Dublin, CA 94568

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12210 Michigan Avenue, #D
Grand Terrace, CA 92324

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2943 Rolling Hills Road
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28181 Marguerite Parkway
Mission Viejo, CA 92692

Computer Stop
3637 Thousand Oaks Blvd
Westlake, CA 91361

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2334 South King
Honolulu, HI 96826

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425 Santa Fe
Encinitas, CA 92024

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11960 Wilshire Blvd
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1840 N Southern
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Computerlines
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16819 Hawthorne Blvd
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Boise, ID 83704

Alpha Computer Systems
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Kennewick, WA 99336

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20101 44th Avenue W., #A 3
Lynnwood, WA 98036

Take A Byte, Inc.
813 W Columbia Drive
Kennewick, WA 99336

Computers Plus
6595 C Roswell Road
Atlanta, GA 30328

Micro Mart
2411 South Cobb Parkway
Smyrna, GA 30083

Statewide Teaching Aids
301 C McArthur Drive
Alexandria, LA 71306

Alpha Computer Center
1341 D George Washington Way
Richland, WA 99352

PerComp Sales
13333 Bellevue Redmond Road
Bellevue, WA 98005

Software Atlanta
2244 Henderson Mill, #800
Atlanta, GA 30345

Computers Plus
130 Town View Plaza, #109
Gainesville, GA 30501

Business Information Systems
3145 Peachtree Road NE
Atlanta, GA 30305

Software Strategies

7412 Washington Avenue South
Eden Prairie, Minnesota 55344

CIRCLE 458 ON READER SERVICE CARD



PROJECT: DATA BASE

Part 2

PC Magazine continues its six-part investigation of the database packages available for your PC. Meet more of the members of Category 1.

Like a second child, this addition to the Project: Database brood benefited from our experiences with the first issue. We presented the first third of the Category 1 databases in issue 11. The following pages bring you the next third of this category, which we have defined as those databases that behave like electronic filing cabinets or Rolodexes and limited to handling only one file at a time.

We are amazed at the multiplicity of purposes and implementations in this grouping. *UltraFile* is strong on input form design, while *THE DATA FACTORY* and *The DataFiler* are tailored for customized output. *Friday!* is written in the language of another database, *dBASE II*, whereas *NEXT STEP* writes database applications in interpretive BASIC. Applied Software Technology, of Los Gatos, California, has had a hand in two very different packages: *Qbase*, which runs under the UCSD Pascal operating system, and the database that promises to replace your paper form, *VersaForm*. You'll also read about a package named *A.I.M.*, which allows 300 attributes per file, a speedy entrant called *TEXTPLUS*, and that old pro, *VisiFile*.

These additions to what is becoming an extended family of database programs for the PC add welcome variety to the project. ■

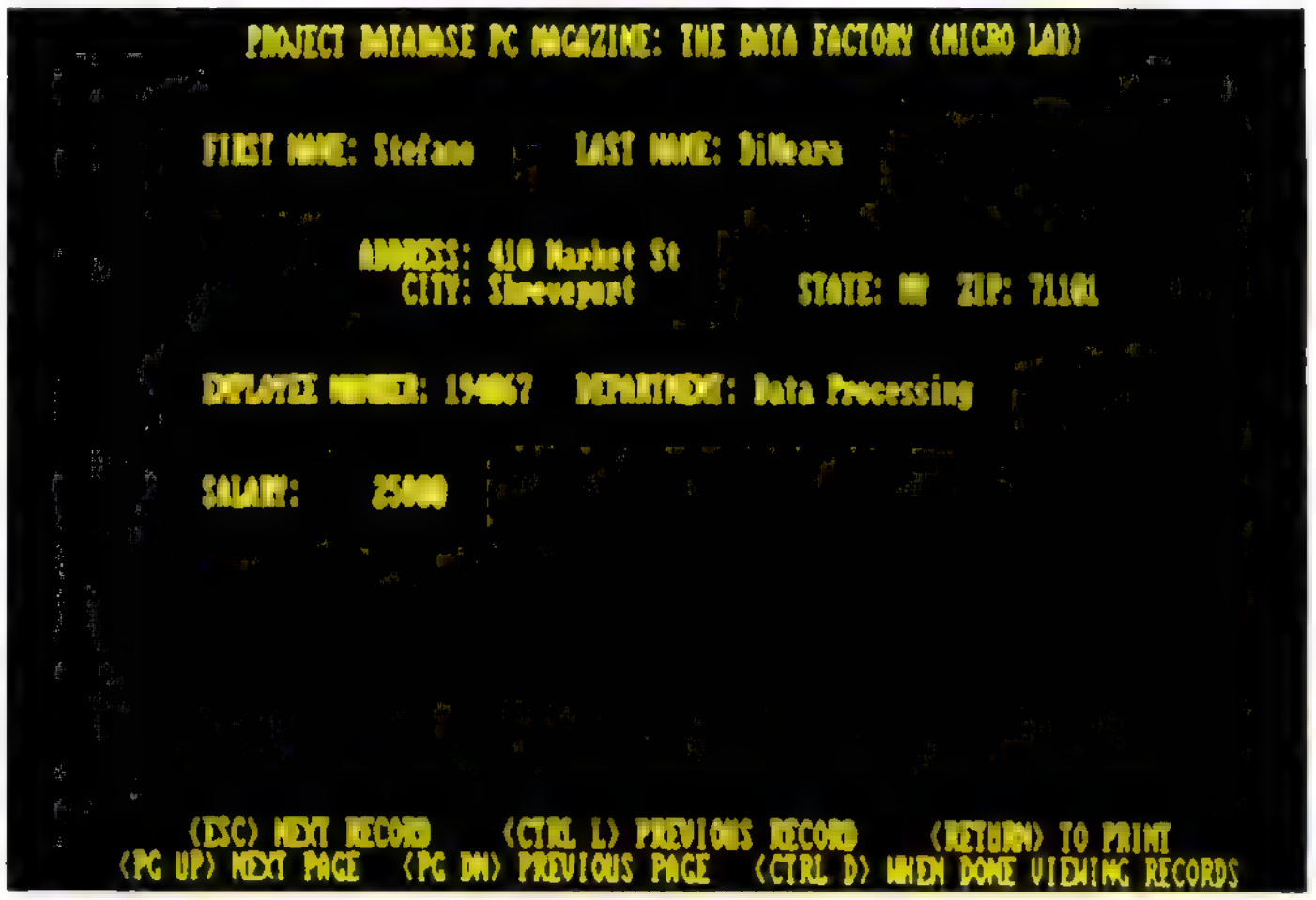
Photograph: Dennis Chalfen

THE DATA FACTORY: Reports Made to Order

Most database programs have one feature that the publisher claims is the specialty of the package. In some cases, this may mean integration with other packages; in others, it is the ability to perform complex mathematical calculations. In yet other packages, the feature is custom outputting. Micro Lab's *THE DATA FACTORY* falls into the last category.

In fact, at times it seems as though the entire program revolves around the printing of custom reports. This is due, in part, to the fact that the little tasks normally associated with creating and maintaining a database are not dealt with in the program. (To a programmer, these tasks may be necessary, but the average end user doesn't need to know the inner workings of a DBMS.) The feeling is further supported by *THE DATA FACTORY*'s diverse filtering criteria and variety of print commands.

Setting up a database with *THE DATA FACTORY* requires entering the field name, type, and length—nothing else. No masks, no validation, no key fields. Although some of these omissions may be detrimental to other database programs, they are not overly missed when using *THE DATA FACTORY*. (Keys are defined later in the program, during the sort routines.) Even file initialization, a feature common to most databases, does not exist. Instead, files are automatically allocated disk space according to the defined record size.



A display of an employee record in *THE DATA FACTORY*.



***THE DATA FACTORY*'s main menu.**

Screen generation is almost as easy as creating the database. Each screen can have a maximum of 1,000 items (text constants and fields) displayed. Fields can be defined as read only, write only, or read/write. Because the write-only option prevents the field from being viewed, it allows for data confidentiality. Once the user has selected the type of entry being made, the entry is painted onto the screen.

THE DATA FACTORY
MicroLab
2699 Skokie Valley Rd.
Highland Park, IL 60035
(312) 433-7550
List Price: $300
Description: Flat file.
Requires: 128K RAM, two disk drives, DOS 1.1 or 2.0.
Records per File: Limited by available storage.

CIRCLE 718 ON READER SERVICE CARD

Illustrations: Phil Anderson

This continues until all the pertinent fields and text constants have been entered. During data entry, the field input area is covered with asterisks (read only), question marks (write only), and dashes (read/write).

Most of the features in *THE DATA FACTORY* make use of the filtering features. When filtering the database for a specific record or field, the user must first choose between 15 comparison levels. The first six compare a field to a constant; the next three are range comparisons (alpha, numeric, or date); and the last six are field-to-field comparisons. The next screen prompts the user to enter the fields or constants being compared, and the type of comparison (alpha, numeric, date, alpha partial, or alpha substring). At this point, the user must select the operand (if, and, or), and, if necessary, repeat the process until all the criteria have been selected.

In the operand screen, the user has the option of re-entering the field being compared by using the "duplicate and" and "duplicate or" functions. There is also a no operation function (NOP) to allow for filter expansion at a later date.

For example, if the user wished to filter out all records whose last-name fields were equal to "Williams" and "Davies," but only those whose salary was over or under a certain amount, the following steps would be taken. The last-name field would be compared to the first constant by using an alpha substring, then the "duplicate or" operand would be chosen and the second constant entered—that would satisfy the first conditions. The salary criteria would be specified in the same manner. Finally, a NOP operand could be included in case a finer selection is desired—by state, for example.

Filtered records can be sorted on any of three keys or according to the physical record order. The keys are generated in the sort. Sorts consist of up to three jobs, each three levels deep. Because the sorts are rather slow when sorting over 300 records, Version 1.3 of *THE DATA FACTORY* includes a Quick Sort feature for only one job of up to three levels.

The options for adding, updating, and deleting records are all accessed from the main menu. Adding requires the use of a screen, while deleting must be done through a filter. To update records, you must start with a screen and can optionally use a filter to select records for update on the basis of certain criteria.

The two lines of options at the bottom of the screen make it easy to scroll forward or backward in the database or to go back a page within the current record. Corrections can be made anywhere on the screen while you are adding or updating records, but read-only fields can not be updated.



THE DATA FACTORY really shines in report customization. That alone is worth the price, once you are able to figure out how to do it.

The user can request a printed copy of records in a number of ways. Individual records can be printed while on the display screen (option 6 of the main menu), even if the "print records" prompt at the beginning of the screen was answered in the negative. Records can be dumped with a Quick List feature, or they can be customized into mailing labels. Print specifications for the Quick List such as break fields, page lines and width, number of decimal places, and number of copies are done on a feature selection screen.

To generate formal reports, three areas must be defined: printer variables, print locations, and math and manipulation criteria. The first establishes margins, lines per page, printer control characters, and type of paper being used. In the print location area, the user must specify where the records, subtotals, totals, and top and bottom of form should be. Depending upon the feature selected, the number of screens to be filled in varies from one to four. The math and manipulations area allows the user to perform simple arithmetic calculations and a large variety of functions on the selected fields. The functions include geometric functions such as Cos and Sin, Boolean math functions such as ABS (absolute value), and a number of data control functions such as move, append, and time. All of the math is performed on a stack.

No one said customizing a report was easy. Fortunately, as many reports as disk space allows can be saved. In fact, Micro Lab suggests putting report, screen, and filter forms on a separate disk so they won't crowd the database.

THE DATA FACTORY has other features such as a Quick Search for finding a specific record, a statistical feature for finding occurrences within a field, a replacement value feature, and a data file reconfiguration feature. It also interfaces with *WordStar* and *Executive Secretary*. However, *THE DATA FACTORY* really shines in report customization. That alone is worth the price.—**Vincent Puglia**

Illustration: Phil Anderson

PROJECT DATA BASE

VisiFile: Almost Perfect

```
Department              Salary   Employee      Last Name
                                 Address
                                 City                    St  Zip
                                 Employ
-------------------------------------------------------------------
Marketing              50,300.00 Eugene        Bradford
                                 888 Centre Park Rd
                                 Lincoln                 NE  68512
                                 694030

Marketing              51,300.00 Joshua        Fallon
                                 160th Ct W
                                 Saint Paul              MN  55124
                                 505940

Marketing              53,500.00 David         Banning
                                 100 Catherine Ave
                                 Cincinnati              OH  45215
                                 593830

Production             13,300.00 Danny         Grant
                                 1211 Rockwell St
                                 Chicago                 IL  60612
                                 359403
```

A *VisiFile* long report.

The impact of the selective feat of evolutionary genetics was never more apparent to me than when I used VisiCorp's *VisiFile*. The program is supplied on four single-sided diskettes and is written in BASIC. There is nothing inherently wrong with BASIC programming, except when you are asked to switch disks with the dexterity of an octopus. It would be nice if the files distributed on the four single-sided disks could be contained on one double-sided, double-density disk, but you run out of room just before the last file on disk 3.

This is a shame, too, because *VisiFile* is a program with potential. The creation routines are extremely easy. You start off by giving your file a name up to 30 characters long. *VisiFile* stores the name in its own statistics section and assigns a proper eight-character file name to your file. For those of you who have ever tried to say something meaningful in eight letters or less, you'll understand the benefit of this system.



Your file can be custom-mapped to the screen for maximum visual impact. Although the program doesn't take advantage of the PC's graphic abilities, you can move fields all over, add text to explain what entries should be made and how, or duplicate them across any of 20 screen pages.

You can even use 18 separate indexes to access a file and keep as many as 10 key fields per index. You are limited to 104 fields per file and 254 characters per field, but that's actually very large.

You can select records by specifying something they all have in common—or something they don't. You can even tell *VisiFile* to find something that sounds like something else. Its retrieval capabilities appear to be flexible. Reports culled from your specifications can be either linear or multiline, at your option. You can position items horizontally via relative tab from the last field or absolute column indication.

VisiFile's manual is excellent. It contains all the information you could possibly need, including 14 pages detailing possible error messages.

This would be an ideal database, except for a few shortcomings. For example, after following the simple instructions to set up a data file, I attempted to import data from an external ASCII file. That isn't so simple. While the database that results is saved in ASCII format, each record has an additional one-character prefix that indicates if it is deleted or not. (The program retains deleted records in case you change your mind. If you copy the file onto itself, it will be filtered out.) You also can't copy information from a file the program doesn't know about, as I discovered after 20 minutes of futility.

You can, however, load the defined blank *VisiFile* data file into a text handler, strip off all trailing carriage returns and line feeds, add a blank character to the front of each record, add a space and eight asterisks, and then change the record count in the corresponding *VisiFile* dictionary file. It sounds more difficult than it is, though it's not for the faint of heart.

Time is also a factor. While *VisiFile* was among the top contenders in its level on retrieval times, the time-consuming process of loading and reloading the basic programs needed to perform the various functions drags down the overall performance.—**Bill O'Brien**

VisiFile
VisiCorp
2895 Zanker Rd.
San Jose, CA 95134
(408) 946-9000
List Price: $300
Description: Flat file.
Requires: 128K RAM, two disk drives, DOS 1.1 or 2.0.
Records per File: 32,000

CIRCLE 720 ON READER SERVICE CARD

A.I.M.: A Unique Approach

When I first saw the *A.I.M.* logo on the user's manual, I thought it must be an acronym for *Advanced Information Manager*, or some such fancy thing. I was surprised to learn that it stands for *Attribute Inquiry Method*. The next step was to figure out just what that meant!

A.I.M. is a little different from most of the other Rolodex-style products available for the PC. Like the others, it allows you to define data fields (up to 15) and specify how long they are (defined in characters, with a maximum of 30). Only one field can be used as the key field. Since the file cannot be modified once it's created—a real problem with *A.I.M.* and other products in its class—you have to be sure the key you've chosen can be easily recalled when you're searching for records. Unique keys are not required.

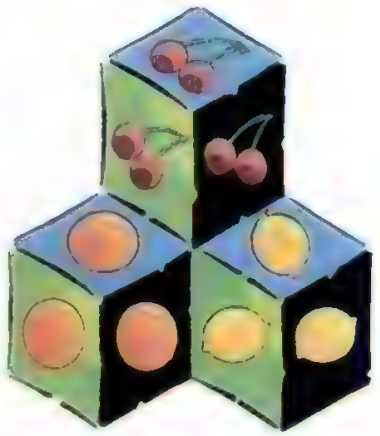
What makes *A.I.M.* different is that you can to define up to 300 attributes for the file in addition to ordinary data fields. These attributes can be any characteristic of a record that might help you pigeonhole things. In a personnel application, for example, attributes might include clerical, typing, word processing, filing, or other job skills. In the used-car business they might include two-door, four-door, sedan, station wagon, or convertible body type.

You can mix and match attributes as you please. Thus, the personnel application might also include education level (high school, business school, college), while mileage ranges could be added to the used car system. Up to ten attributes can be applied to any record in your file, allowing you to specify, for example, a two-door sedan with over 50,000 miles.

Entering data and selecting record attributes was as easy as typing, although I was annoyed by the lack of an erasing backspace key or a functioning delete key. *A.I.M.* also has an "auto-entry" feature that I find a nuisance. (Some database users apparently like it if the number of packages employing it is any measure.)

Unfortunately, the flexibility offered by *A.I.M.*'s attributes is limited because only the single item designated as the file's key can be used to scan the database for record update or deletion. The attributes can be used only for selecting records for a report or querying the database (these are the same function with slightly different prompts). You can restore some flexibility if you realize this limitation in advance and define attributes to have the same meaning as the key (or other) field in the database, but doing so may be somewhat awkward.

Defining reports is easy. As you spec-



Reports can be generated for the entire file or for any subset of attributes. They can be printed out as hard copy or displayed on the screen.

A.I.M.
CompuSoftware, Inc.
6350 LBJ Freeway, #271
Dallas, TX 75240
(214) 392-0051
List Price: $250
Description: Flat file.
Requires: 128K RAM, one disk drive.
Records per File: 4,000

CIRCLE 721 ON READER SERVICE CARD



An *A.I.M.* screen for modifying an employee record.

ify rows and columns, the field positions are displayed as numbered rows of dashes on the screen. When you're finished, you have a good idea of what the report will look like when it's printed. *A.I.M.*'s report generator allows five-line headers (which are neatly printed at the top of each page of the report). Reports can be generated for the entire file or for any subset of attributes and can be printed out or displayed on the screen.

The only way to select a subset of *A.I.M.* records for reporting is by specifying attributes from your list. No sorting or calculations of any kind are available in *A.I.M.*'s report generator. CompuSoftware representatives said that these additional complexities were left out to keep the system simple and quick (both to learn and to use).

The *A.I.M.* user's manual's excellent tutorial takes you easily through the whole process. The entire manual is clearly written and complete with accurate illustrations of each screen. For some reason, the tutorial takes you from creating a file to formatting reports, and then on to data entry, maintenance, and report printing. The order may be odd, but almost everything worked as described.

Don't forget, though, that *A.I.M.* is brand new. Like any new software product, it has a bug or two. For example, *A.I.M.* cannot print with a spooler in place and will not function on a computer with more than 512K of random-access memory. On the plus side, CompuSoftware does offer helpful technical support to its customers.

A.I.M. is a good data filer and retriever for fixed applications (its one file per disk file-naming convention indicates that this was a product objective), and CompuSoftware gets points for its unique attribute approach. The product is easy to use and adequate as far as it goes, but *A.I.M.* should have been aimed higher. Computers are made to compute and a database manager that can't sort doesn't seem to be the sort of product that's going to make it. **—John Dickinson**

TEXTPLUS: A Database Bully



Text program main menu in *TEXTPLUS*.

Lurking beneath the infuriating user interface of *TEXTPLUS*, and well hidden behind a badly organized manual, is a fairly powerful database program. But it may take a while to unearth it.

TEXTPLUS combines database functions with word processing and some graphics in a single $240 package. It runs on any PC with 64K RAM or more, but 128K is recommended, and the program can take advantage of up to 192K.

Most of the functional limitations of *TEXTPLUS*—but also its terrific speed—result from its use of memory for most data manipulations. Database size limits depend on available memory. With the recommended 128K, where 37,000 bytes is the file maximum, you could only have 24 1,500-byte records; if you have 1,000 records, they can't average more than 37 bytes long.

TEXTPLUS makes very efficient use of space for its files. They are stored with all the contents compressed into the minimum possible space, with a backslash (\) as the delimiter between fields. Thus the test file, which consisted of 500 records that could run up to 100 bytes long, only required 38,144 bytes on disk.

Defining a file and entering data is straightforward: menu selections allow you to specify field names, maximum lengths, and types (character or numeric only), and *TEXTPLUS* prompts for data in a simple, unchangeable format. Subsequent additions to the list of fields are easily made. Removing or rearranging fields requires you to make a copy of the file, and is also simple to do.

TEXTPLUS offers a good selection of

TEXTPLUS
Owl Software Corp.
6927 Atoll Ave.
N. Hollywood, CA 91605
(818) 982-6243
List Price: $240
Description: Flat file.
Requires: 64K RAM for interpreted BASIC version; 128K for compiled version.
Records per File: 300 in a 64K file; 1,000 in 128K and 192K files.

CIRCLE 722 ON READER SERVICE CARD

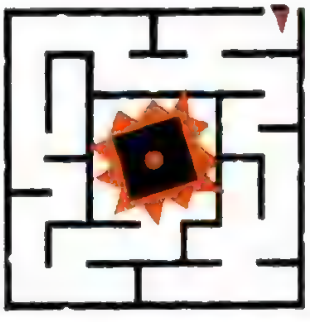
functions for creating subfiles of a particular file. It can extract records based on field values equal to, greater than, or less than a particular value. Choices can be joined with logical "and" or "or" operators, so you can ask for all the people with salaries over a certain value who live in Seattle *or* are with the data processing department.

Browsing through the file on screen is a simple task to perform. You can ask to see a record containing the string "Seattle", for example, and see it almost instantly. However, you can't then step through all the Seattles; you can only go sequentially through all the records, either forward or backward.

Files are sorted quickly because they are handled in memory. Sorting 400 records on a 9-character numeric field took only 17 seconds. Unfortunately, the fact that a file is within *TEXTPLUS*' stated size limits—and can therefore be loaded into memory—doesn't necessarily mean it can be sorted. A full 500 records could be loaded for editing, but trying to sort them brought a "not enough memory" message. From the test sort, 400 records (about 31,000 bytes) appeared to be the limit for sorting, although no limit is given in the documentation.

TEXTPLUS doesn't understand numeric data very well. If you specify that a field is numeric, the program still doesn't prevent you from entering non-numeric data into it. It doesn't understand that 17600 and 17600.00 and 17,600 all represent the same number. When it sorts on a numeric field, the sort is done according to the ASCII character value of the field, so the value 17,600 (with the comma) would be sorted as six ASCII characters, and come out earlier in the sort order than 153000 (without a comma); and 17600.00 (seven characters) appears ahead of them all. When *TEXTPLUS* selects records according to numeric values or sums them in a report, 17600 and 17600.00 will be correctly treated as identical values. But 17,600 will be treated as if it were the number 17. So you have to be consistent in the way you (and your seventeen assistants) enter data, and you can't enter commas for clarity if you ever plan to use the value as a number.

TEXTPLUS produces database output



TEXTPLUS, in spite of its shortcomings, is powerful, quite flexible, and not too expensive.

in two ways: either in a standard tabular presentation, or fully formatted with *TEXTPLUS*' built-in word processing features. With the tabular presentation, the fields are typed across the page in the order they are stored. If you don't want to see all the fields, you have to first extract the fields you want and create a sub-database. Ditto if you want to see only some of the records in the file. The standard format allows reporting of the total for any numeric field, and you can request a subtotal whenever the value in a particular field changes. Thus, with an employee database sorted by department, you could automatically generate a report with departmental salary subtotals, by requesting a salary subtotal whenever the department number changes. No other type of mathematical calculation is possible.

Custom reports are created using the mailing list merging features of *TEXTPLUS*' word processing system. You specify a layout as if it were a form letter, and at the print stage *TEXTPLUS* gets the variable information from the data file. The printout skips to a new page for every new record in the data file. If you want to print several records' worth of information on a page, you can trick the program by specifying a page length of, say, 11 lines instead of 66, but you'll get legends and headers either with every record or not at all. In this report, no math is allowed.

TEXTPLUS consists of three different programs, each of which performs some database functions as well as its own functions. The text program, which does most text handling, is required to print data files when they're formatted for custom reports. The main data program creates and modifies databases, prints them out in their default format, and handles sorting. The select program, among other tasks, handles extraction of records or parts of records from files, prints mailing labels, and merges and splits data files.

The reason *TEXTPLUS* is infuriating to work with is that this three-program structure is not reflected in the main menu. Say you've just fired up the system, and you want to print a standard format report from a database. On the menu, you see "Print," option number 6. Looks good, so you choose it. Does *TEXTPLUS* ask, "Print a document, a database, or mailing labels?" No. It replies that there's no file loaded, and sends you back to the main menu, from which you choose option 1, "Read from Disk," and tell it the file name. Disks whir for a while, you're told the file has been loaded, and the main menu reappears. Let's try pressing 6 for print again. Now *TEXTPLUS* checks the type of file you've loaded and discovers it's a data file—so you must want to print data. The screen goes blank except for the words "program loading," and several whirring seconds later you are presented with an identical-looking main menu, but now you're in the data program and the file you loaded before has been dumped.

So you again read from disk, again press 6 for print, and finally get results.

This type of convoluted, irritating runaround happens regularly with *TEXTPLUS*. There is an easier way to get the results you want, but it's hidden under "Program Selection," item 14 on the main menu. The manual, which must have been written by the same person who designed the user interface, is equally difficult to navigate. Eventually you get the picture, but that's no excuse for the tortuous path that *TEXTPLUS* drags you along the first time.

And yet, in spite of its shortcomings, *TEXTPLUS* is powerful, quite flexible, and not too expensive. It has a number of neat features, like doing simple direct manipulations on disk files from the main menu. You can do simple arithmetic calculations with your computer, a feature that all programs should include. The word processing part, though it was not evaluated thoroughly, appears to be respectable. Printer buffer software comes with the system.

A.I.M. is a little different from most of the other Rolodex-style products available for the PC.

So who's it for? Someone who likes intricate things, who likes the thrill of discovering a new feature in an out-of-the-way corner of the manual 6 months after starting to use the program. Perhaps the kind of person who actually uses all those buttons and knobs on the dishwasher (probably the least user-friendly household appliance). And perhaps someone with limited funds who considers a large variety of features to be more important than elegant design. **—John Helliwell**

Qbase: Filing a la UCSD Pascal

The *Qbase* program bills itself as a personal database/report system that insulates you from the complexities of programming. To a large extent this is true. It handles data and recordkeeping tasks fairly simply. In the process, however, *Qbase* saddles the PC owner with one overbearing, unforgiving complication: It runs under the UCSD Pascal operating system.

I expect computers to make life simpler. During initial configuration of hardware and software, I'll lower my expectations to tangle with technical trivia. Add-on cards, cable interfaces, and disk drives, topped off with the challenges of operating PC-DOS—there's hardly a vacant brain cell left by the time you are all through. But when I run applications software, I expect to be coddled and pampered. Learning the intricacies of another operating system at this stage amounts to nothing more than a practical joke.

Unfortunately, cultivating data on the turf of *Qbase* reminds me of such a prank. You don't actually need to know the intricacies of command line syntax and utility options of UCSD Pascal. But just enough evidence surfaces in *Qbase* to let you know that you're on foreign territory. Moreover, all that hard-earned information culled about PC-DOS is truly useless; you might as well erase it from your cerebral RAM.

As a seasoned PC-DOS user I quickly encountered two UCSD Pascal idiosyncrasies that made me feel uncomfortable. First, the A: and B: drives are designated as drives 4 and 5. If *Qbase* was friendly, it could have easily converted an A: or B: into a 4 or 5 for the operating system.

Second, typing Ctrl-C, a frequently used method of aborting an operation in PC-DOS, locks up the keyboard in *Qbase*. You're left with no recourse other than rebooting. Why on earth would an applications program allow the keyboard to be locked in such a manner? I'll buy lunch for anyone who has a logical explanation for that one.

For the typical PC owner, the UCSD operating system quality detracts from the program's utility. On the other hand, there is a contingent of PC users who compute in this environment. If you're enamored with UCSD Pascal—read on. Given the limited selection of software for this operating system, you'll want to give prime consideration to *Qbase* before investing in an electronic filing program.



Qbase shines in two major areas: input editing and data searching. The program offers a robust set of 11 input editing functions. These include setting the minimum and maximum lengths of a field. Minimum length comes in handy for fields such as state names that are a minimum of

Qbase
Applied Software Technology
170 Knowles Dr.
Los Gatos, CA 95030
(408) 370-2662
List Price: $195
Description: Flat file.
Requires: 128K RAM, two disk drives.
Records per File: 2,700

CIRCLE 723 ON READER SERVICE CARD



A *Qbase* main menu.

DEPARTMENT	SALARY	FIRST NAME	LAST NAME	
ADDRESS	CITY	ST	ZIP	EMPLOY
Accounting	1550000	Alex	Marshall	
1018 S. Wabash Ave	Champaign	IL	60605	404904
Data Processing	2580000	Stefano	DiMeara	
410 Market St	Shreveport	LA	71101	194067
Data Processing	2750000	Alice	Horton	
8 Daniels Place NE	Cedar Rapids	IA	52402	303039
Data Processing	2920000	Rae Ann	Howard	
845 Richland Ln.	Herndon	VA	22071	304583
Data Processing	3050000	Mitzi	Matuso	
McCurley Dr.	Anderson	SC	29624	203821
Data Processing	3210000	Marlena	Evans	
799 51 St. NE	Fort Lauderdale	FL	33334	504830

A *Qbase* report.

four characters (the shortest being Iowa, Ohio, and Utah). Maximum length forces the operator to "fill out" a field completely. For example, a maximum length of five would be set for a zip code field, since it's never less than five characters.

The program can also justify fields left or right, require mandatory entries and yes/no replies, and check input against ranges and lists. Range checks work on both numeric and alphanumeric fields. A list may encompass 99 values of up to 20 characters each. If the operator entry for a "list-checked" field is not in the list, then the entry will be rejected. This feature, for example, would safeguard you from inadvertently entering the abbreviation "OX" in an address field that required a two-letter state abbreviation.

Other editing functions include standard operations such as numeric values, calculated fields, and filling a field with the system date. Overall, the editing features are substantial for a system that bills itself as a personal database.

The second major strength of *Qbase* is its ability to perform ad hoc searches on any field. The fields need not be indexed, although indexing does improve performance. Other systems frequently invoke a separate selection program to perform such a search. *Qbase* performs it within the same program that retrieves records by keys. The search is sequential and slow, but it's a nice feature to have.

Undoubtedly, this product's most annoying operating problem is its tendency to hide the cursor on a data entry field. The cursor appears as a flashing underscore. Data entry fields appear highlighted. When *Qbase* puts the cursor in the middle of a data field the cursor vanishes—Houdini would be proud. You must position it outside of the highlighted area to determine where it is located. The program should compensate for this and invert the cursor when it's positioned on a highlighted field.

As for speed, *Qbase* wins no prizes at the race track. The software is constantly paging from the disk. Records are not buffered in memory.

The final weakness is *Qbase*'s sheer bulk. The system is distributed on three diskettes comprising program, work, and utility functions. Creating and printing a report entails swapping the program and work diskette. To print a report of a small file, 25 records, I had to swap disks four times. My interpretation of such shuffling is that *Qbase* begs for a hard disk. But, alas, it doesn't support one.

I called Applied Software Technology and asked them about *Qbase*'s hard disk limitation and other problems. Their stock answer was *"VersaForm." VersaForm* is the advanced sibling of Qbase; a more powerful, flexible tool (it runs under PC-DOS) it also commands a higher price. Qbase appears to be an abandoned stepchild. This was most apparent when I inquired about the update policy. "No update policy has been instituted because no updates are planned," the technical support representative replied curtly.

Need I say that for most computing aficionados in search of an electronic filing system, there are better ways to invest $195? *Qbase* offers some fine features, but these sum to zero for the PC owner unwilling to grapple with the UCSD environment. If you need a filing system compatible with the UCSD operating system, then definitely pursue *Qbase*. Otherwise, eschew! **—Edward Joyce**

Input Screen Specification

Method	Capabilities				
	No. screens per file	No. files per screen	Simulate paper forms?	Link help messages/ prompts to a field	Master/detail relationship
Automatic; can paint input screen later.	One datafile per disk, as many filter, input and print screens as desired.	1	Yes	Yes	No
Automatic is default; "painted" is optional.	20	1	Yes	Yes	No
A.I.M. presents entry menu in its own format. User defines prompts.	1	1	No	No	Numbered attributes form a type of master detail record relationship.
Automatic. Format similar to the default *dBase II* format, with field names and delimiters for data entry.	1	1	No	No	No
"Painted"	1	1	Yes	No	No
Programmed	1	1	Yes	No	No
Interactive/ menu-driven	1	1	Yes	No	No
Automatic/ "painted"	1	1	Yes	Yes, some on-screen, some with function keys. Introductory screens can be bypassed	No
"Painted"	1	1	Very much so	No	Variable rows of information on form are stored as subrecords.
"Painted" on line-by-line basis.	1	1	Yes	Can customize link to field	No
Automatic	5	1	Yes	Yes	No

PROJECT DATA BASE

Name	Data Model	Marketing Features		
		Length of Time on Market	Number of Sales	Price
THE DATA FACTORY (Version 1.3) MicroLab 2699 Skokie Valley Rd. Highland Pk., IL 60035 (312) 433-7550	Flat file	Since 1981	Confidential	$300
VisiFile VisiCorp 2895 Zonker Rd. San Jose, CA 95134 (408) 946-9000	Flat file	Since 1982	60,000 for all versions	$300
Attribute Inquiry Method (A.I.M.) CompuSoftware LBJ Freeway #271 Dallas, TX 75240 (214) 392-0051	Flat file	Since February 1984	Less than 10	$250
TEXTPLUS (128K Version) Owl Software Corp. 6927 Atoll Ave. N. Hollywood, CA 91605 (818) 982-6243	Flat file	Since 1982	750	$240
Qbase (Version 1.4, Release 1.1) Applied Software Technology 170 Knowles Dr. Los Gatos, CA 95030 (408) 370-2662	Flat file	Since 1983	Confidential	$189
Friday! Ashton-Tate 10150 W. Jefferson Blvd. Culver City, CA 90230 (213) 204-5570	Flat file	Since 1983	Over 12,000	$300
DMS III Microline, Inc. 1701 W. Front Tyler, TX 75702 (214) 592-3778	Relational, but operates on only 1 file at a time	Since April 1983	350	$295
The DataFiler (Version 1.0) MBS Software 12729 N.E. Hassalo St. Portland, OR 97230 (503) 256-0130	Flat file	Since January 1984	Confidential	$195
VersaForm Applied Software Technology 170 Knowles Dr. Los Gatos, CA 95030 (408) 370-2662	Flat file with sub-records	UCSD version since September 1982, DOS version since November 1983	About 3,000 for the DOS version	$389
NEXT STEP Execuware, Inc. 4018 Country Club Rd. Winston-Salem, NC 27104 (800) 438-3636	Relational, but operates on only 1 file at a time	Since May 1983	Confidential, but more than 500	$345
UltraFile (Version 1.3) Continental Software Co. 11223 South Hindry St. Los Angeles, CA 90045 (213) 410-3977	Flat file	Since January 1984	Over 5,000	$195

Friday! A Long but Productive Day

My hands trembled as I slipped *Friday!* into the A: drive. After all, this product is from the same people who brought the world *dBASE II* and it has a great deal to live up to. The first inkling that it might not be its own master was brought on when the *dBASE II* runtime message appeared on the screen.

To understand how *Friday!* operates, you must remember that it was written in the language of *dBASE II*. Not surprisingly then, it turns out to be cranky, stubborn, not entirely bug-free, but exceptional once it's working.

The file creation process is tedious. Rather than submit you to a complete session of entering field names, you're put into a general Creation mode. Every time you wish to add a new field name you select A from the menu at the bottom of the screen. You tell *Friday!* your field's name, how long it is, what kind of data it is, either Anything or Math (loosely translated as "numbers only") and set up a character mask that will make sure what you want is what you get. After you've done all of that and are ready for the next one, you're back in the menu mode and must select A again.

This format carries through all of the work you do, from inception through retrieving information. It works, but it's time consuming, especially when you consider that by the time you're convinced you need a database, you're probably already in over your head. At that point, the thing you need most is speed. You don't get it with *Friday!* without using relatively large amounts of data.

Friday!
Ashton-Tate
10150 W. Jefferson Blvd.
Culver City, CA 90230
(213) 204-5570
List Price: $300
Description: Flat file.
Requires: 128K RAM, one disk drive, DOS 1.X or 2.0
Records per File: 65,000

CIRCLE 724 ON READER SERVICE CARD

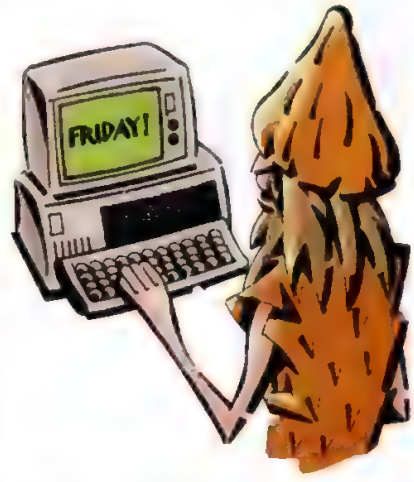
```
12000.00 Accounting        Doug        Williams
                           P.O. Box 57165
                           Washington              DC 20037
                           120740
12000.00 Accounting        Joshua      Fallon
                           1251 Exchange Dr.
                           Richardson              TX 75081
                           121790
12000.00 Accounting        Al          Bruno
                           9300 W. 100th St.
                           Overland Park           KS 66210
                           122840
```

A *Friday!* customized report.

It took 4 seconds, after recalling an item on a 25-item file, to reach the point where the field could be edited. You press the E key and wait. Keep in mind that the 4 seconds doesn't include the time spent trying to recall an item. You lose only a little more than 1½ seconds when sorting a file by only one field. Add another sort criteria and you lose 7 additional seconds running from whatever record is on the screen to the next one in the index. If you want to recall a range of information linked by a common factor, it can take 2 minutes to explain to *Friday!* which item you want to use as the criteria for the selection. That adds up to almost 4 minutes to recall and edit six items, under worst-case conditions. And don't kid yourself, worst-case scenarios occur more often than you might like to believe. These numbers averaged out approximately the same when tested on files containing 500 pieces of information.

The program's functions are almost worth the wait. Any database can be edited, even after you've entered data. You can change the input form as many times as you like, or even keep a few different ones around. The first field entered becomes the field on which the file is sorted. Later on, if you want to change that field or if you want to add another, you can just do so. You can also wait until you want to print and change it only for that particular report.

The report generator included with the package can produce a variety of types of formatted output. There are actually two versions, a quick report and a custom report package. The first is a row-oriented facility that produces simple, straight-line documents. It generates material relatively



fast. Beware of a known bug in the quick report in Version 1.0 of *Friday!*.

You may be tempted, because setup time is so short, to go back in and produce a variety of reports in a variety of formats. Unfortunately, after about five trips to the menu, you'll receive a "Too Many Memory Variables" error message and get

(continues)

Entry Editing Capabilities					
None	**Range Tests**	**Specific Values**	**Default Values**	**Table Lookup (To an Outside File)**	**Verify (Requires Data to Be Input Twice)**
—	For length and type	No	Blanks	No	Yes
None	—	—	—	—	—
—	No	No	No	Attribute entry(s) must come from predefined table.	No
—	No	No	No	No	No
—	Yes	Yes: value list may contain up to 99 values with 20 characters per value.	Current date	No	No
—	No	No	No	No	No
—	No	No	Specified values held from previous record	No	No
—	Yes	Yes	Blanks for alpha values, defined minimum for numeric values.	No	No
—	Yes, for alpha and numeric values, can test length of data item.	Can check input data against a table of up to 99 permissible values	Can fill with date, automatic or calculated value	The lookup table is within the database	No
—	Yes	No	Yes	Table lookup using self-contained table of values coded into program.	No
—	Yes	No	System date automatically put into date fields; can be overridden.	No	No

			Adaptation to PC		
Required Field	**Date Tests/Date Conversion**	**Other**	**ASCII Characters Only**	**Graphics Symbols**	**Color**
No	No	Input screen choice and verification	Yes	No	No
—	—	—	Yes	No	No
Index	No	No	Yes	No	No
No	No	Can bring a value forward from previously entered record.	Yes	No	No
Yes	Ensures month and day ranges, no conversion.	Can specify minimum/ maximum lengths for fields. numeric only fields. y/n only fields for yes/no responses	No	No	No
No	No	Input mask for alpha-numeric or mixed entry.	Yes	No	No
No	No	Last name, first name conversion.	Yes	No	No
Yes, as many as desired.	Yes	Separate function key is used to save edited data.	No	No	Yes
Yes	Can test for date format and date ranges.	Can compute a check digit and convert a value to a fixed number of decimal digits	Yes	No	No
Yes	No	Left/right justification, automatic date and time entry, repeat field data from last record entered.	Yes	No	No
No	Validates month and day ranges.	Can specify fields for telephone, formulas, text styles.	No	Draws boxes, arrows, and graphs.	Yes

DOS 2.x Subdirectories	Alternate Input Methods (mouse, etc.)	Files Across Multiple Drives	Function Keys	User Interface	Files: Method of Data dictionary or other means
No	No	No but disk swapping allowed	No	Prompting	Enter field name, type and length one by one
No	No	No	No	Visual	Primitive data dictionary.
No	No	No	Occasional use of function keys	Visually quite functional with reasonably polite beeping and honking	Field specifications done in menu environment
Will access files in a subdirectory but only if subdirectory is specified before entering TEXTPLUS	No	No	Used well in word processing module but used inconsistently elsewhere	Verbal interface with articulate descriptions and messages Clear prompts	No
Not applicable runs under UCSD Pascal operating system	No	No	Yes	Menus screen forms	No
No	No	No	No	Visual/prompting	Individual files kept with reference data
No	No	No	No	Prompts appear in logical places Visually, program uses menus and suggested choices are often given	Yes, but limited to 1 file
No	No	No	Can be programmed to enter data	Extremely verbal, each section is prefaced with an introduction that can be bypassed	File specification is done with a series of 4 screens
No	No	No	Effective use of function keys for commands and menu selections Provides reference card	Very visual; is form-oriented.	Specification is the form itself
No	No	No	Yes	Verbal prompting	Built as entry screen is defined
Yes	No	No	Yes	Menus screen forms also graphics	No

Copyrighted mater

Specification	Things You Can Specify				
Must files be built/modified only from data dictionary?	None	Field data	Tokens, aliases, or synonyms	Index data	Permissions/security
Files can be reconfigured through a utility.	None	—	—	—	—
No	—	Yes	No	No	No
Yes	—	Field length only	No	Required	No
Files can be built/modified directly, using word processing mode, but program discourages this.	—	Can specify name and length, numeric or character. Defining a field as numeric affects the way it is handled for comparisons when extracting data, but does not cause input editing	No	No	No
—	None	—	—	—	—
—	—	Yes	No	No	No
Yes	—	Alpha, numeric, and date	No	Yes, up to 5 key fields per record.	No
Yes	—	Yes	No	No	No
No	—	Name, length and extensive entry-editing capabilities.	No	Must specify a unique key, composed of 1 or 2 fields.	No
Yes	—	Name, length, type.	No	Yes, 1 index maintained on up to 15 fields or 100 characters.	2 levels, both on data entry and reporting.
—	None	—	—	—	—

					System
					Maximum No. Record Types per Database
Encryption	Relations	Validity tests	Error or prompting messages	Multiple views of database	
—	—	—	—	—	1
No	No	No	No	No	1
No	To attribute table	No	No	No	15 record types + 300 attributes
No	No	No	No	No	1
—	—	—	—	—	1
No	No	No	No	No	1
No	No	Only by data type	Only on wrong data type	No	1
No	No	Yes	No	No	1
No	No	No	No	No	1
No	No	Yes, range edit and table edit.	No	No	1
—	—	—	—	—	1

Specifications					Error Handling
Maximum No. Fields per Record	Maximum Record Size	Maximum No. Records per File	Maximum No. Records per Database	Maximum Field Size	
Limited by disk space.	Limited by disk space.	32,767	—	78 bytes	Field-by-field for range and type only. Total reprompting in certain areas. Selective re-prompting at point of error.
104	25,400 bytes	32,000	—	254 bytes	Field-by-field and total reprompting.
15 fields + 10 attributes	450 bytes	4,000	4,000	30 bytes	No
21	253 bytes in a 64K file; 1,500 bytes in 128K and 192K files.	300 in a 64K file; 1,000 in 128K and 192K files.	—	72 bytes	No
75	4,000 bytes	2,700	—	78 bytes	Field-by-field and selective reprompting.
32	999 bytes	65,000	—	999 bytes	*Friday!* and *dBASE II* messages if fatal error.
60	3,600 bytes	32,767	—	60 bytes	Field-by-field, total, and selective reprompting.
45	1,024 bytes	1,800	—	65 bytes	Field-by-field, total, and selective reprompting.
75	4,000 bytes	Limited by disk space.	—	78 bytes	Errors checked only at completion of input, but individual fields can be re-entered.
99	510 bytes	No limit stated.	—	78 bytes	Not customizable, but field-by-field depending on field type.
50	1,000 bytes	32,000	—	100 bytes	Field-by-field and selective reprompting.

Data Types and Maximum Sizes

Character	Numeric				Date
	Integer	Floating point	Money or dollars	Other numeric	
78	78	No	No	Unlimited length	8 characters, in form MM/DD/YY.
254	No; all numeric data stored as character.	No	No	No	No
30	No; all numeric data stored as character.	No	No	No	No
72	72; all numeric data stored as character. Sometimes data handled as numbers, sometimes as characters.	No	No	No	No
78	13 places, 8 of which can be to right of decimal point; decimal point and minus sign count as places.	No	No	No	8 characters
32	10	10 places, including decimal point.	No	No	No
60	60	No	No	No	Yes, choice of 5 or 8 characters; mm/yy or MM/DD/YY.
65	65	Single-precision and double-precision floating point.	Numeric fields can have a $ mask or a specific number of decimals.	No	Alphanumeric fields can have a date mask.
78	13 digits to left of decimal place, 8 digits to right. Can round input to 2 decimal places.	No	No	No	Format MM/DD/YY can be converted to DD/MM/YY.
78	16	16	16	No	Yes, system date, 8 characters, in form MM/DD/YY.
100	15 places, including decimal point and minus sign.	No	15 places	No	8 characters

		Demo Version			Data Importing
Time	Logical	Available?	Cost	Limitations	
No	No	No	—	—	No
No	No	No	—	—	DIF *VisiCalc*, and *VisiTrend/Plot*
No	No	No	—	—	No
No	No	No	—	—	Data importing is not a feature of the package However, because the records resemble SEQ records, some importing is possible using word processing functions.
No	Yes	No	—	—	No
No	No	No	—	—	Yes
No	No	No	—	—	No
No	No	No	—	—	ASCII; I was unable to import either of the 2 G1person files; either the file would not import, or when it did, it duped some records and played havoc on the salary field.
No	Yes	No	—	—	No
Yes	No	No	—	—	No
No	No	No	—	—	DIF, SDF, ASCII, *WordStar* and Lotus' *1-2-3*

Data Exporting	Advanced Features				
	Back-up-ability/ Copy Protection	Audit Trails		Data Restructuring	
		Pre post imaging	Activity or transaction log	Technique (inherent separate program)	Adding or changing indexes
DIF, SDF, *WordStar* and *Executive Secretary*.	Not copy protected	No	No	Through utility, creates separate database	No
DIF, *VisiCalc*, and *VisiTrend/ Plot*	Not copy protected	No	No	Inherent	Yes
No	Not copy protected	No	No	No	No
Not a feature of the program, could only be done in a manner similar to import procedure	No automatic backups though files can be saved under different names	No	No	Inherent. Can remove or reorder fields by copying the database and specifying only the desired fields. Cannot change field width, but field width is not very important in this system	No
ASCII to other programs within the UCSD Pascal System	Copy protected	No	No	Inherent	Only one index allowed, consisting of up to 40 characters and one or two fields
DBF, DIF, and SDF.	Not copy protected	No	No	Inherent	Yes
No	Not copy protected	No	No	Inherent	Yes
ASCII	Not copy protected	No	No	File can be restructured but must maintain parameters originally set up and allocated for. If fields are deleted, they must be replaced with an equal field or omitted through the screens	Only index allowed is key field, and it must be the first field
SDF, SEQ, mailing label, and word processing formats	Not copy protected	No	No	Inherent. Can be done but is slow and awkward	No
No	Not copy protected	No	No	No	Up to 9 additional keys may be specified for use with reports; these are not maintained during data entry
SIF, SDF, ASCII, and Lotus *1-2-3*	Not copy protected	No	No	Inherent	Yes

		Report Generation			
		Capabilities			
Linked or Multiple Update of Indexes and Files	High-level Language &/or Product Interface	Sorting	Aggregates (min, max, count, avg., percent, etc.)	Arithmetic (#, /, +, −)	Parameter passing
Yes	*WordStar, Executive Secretary*	Up to 3 sort fields.	Statistical section allows for total sum of field, total difference, average value, count entries in field, count occurences in field.	Yes	No
No	No	Up to 10 sort fields.	No	Total, subtotal, cross total, horizontal total. Can do arithmetic on fields defined at creation.	No
No	BASIC programs	Not available; can do approximate sort if attributes are constructed to anticipate application.	No	No	No
No	No	Fast, with no apparent limit to the number of sort fields; ascending order only. A numeric value 15 digits long caused sort to crash.	No	In standard report, totals and subtotals available.	No
No	No	Up to 3 sort fields.	No	Totaling and subtotaling on up to 8 numeric fields.	Report title and values for query selection can be passed to report.
No	No	Up to 5 sort fields.	Yes	Yes	No
No	Can be used with text produced by a word processor or for a mail-merge function.	Yes, numeric and alphabetic; 1 sort field.	No	Yes	No
No	No	Up to 3 sort fields.	No	Arithmetic and exponentiation	Yes
No	No	Up to 3 sort fields.	No	Totals, and subtotals on change of field value. Further arithmetic must be specified when input form is created.	No
No	Can interface with *Easywriter 1.1* and *WordStar 3.2* for form letter merging, but with severe restrictions.	No, but new key may be defined when report is created.	No	Yes, plus exponentiation and up to 15 subtotals.	No
No	No	Up to 5 sort fields.	No	Yes, plus totaling.	No

		Query Language			
Flexibility of output	Multi-file access	Mass additions, deletions & updates	Load and unload	Execute stored scripts	Quality of output
Very flexible. This is Micro Lab's raison d'être.	No	Yes	No	No	Excellent
Types of output are report form, mail label, form letter.	No	No	No	No	Good
Is easy to use, pages correctly, and can create up to 5 lines of header.	No	No	No	No	Fixed, same as input screen.
Must choose between math and formatting capabilities	No	No	No	No	Reasonably flexible and fast.
Can output to screen, printer, or disk file. Report includes system date and page number. Paper width and length can be specified.	No	No	No	Yes—query or selection for report can be made on algebraic conditions coupled with and/or; 3 conditions may be specified simultaneously.	Fair
Excellent	No	No	No	No	Good
Good for this level of program. Fields can be shown selectively in the report.	No	No	No	Yes, limited to stored specifications, not actual commands.	Good
Allows for totaling of up to 10 fields.	No	Yes	No	No	Good
Has standard column form and a more limited, but highly formattable, form.	No	Yes, by copying to new files.	No	No	Good
Very flexible, with some limited form-letter capabilities.	No	No	No	No	Good
Report includes system date and page number. Paper width and length can be specified.	No	Updates can be done by query. Additions and deletions require restructuring.	No	No	Good

Other	Report Formatter/ Generator	Screen Dumps	Other	Built-in Applications or Examples	Procedural Language
Has statistical section that does not interface with database.	Yes	Can dump the entire database in any format desired.	Customized output	Sample data disk provided.	No
No	Yes	Yes	No	No	No
No	No	Can obtain "detailed listing" of file.	No	No	No
Extraction of a subset of records or fields is easy.	Plain column-by-column reports are easy; must report all fields in the order they are stored. Print compression and mail merge available. No math.	No	No	A diskette of examples comes with the system.	No
No	Yes	Yes	Mailing labels—up to 9 across page. Two files of identical format can be accessed for report.	Yes	No
No	Yes	No	Two reports—short and long.	No	No
No	Yes, but limited	Yes, during browse	No	Yes, mailing list example.	Primitive form
No	Yes	No	Prints labels	Sample data disk and tutorial.	No
No	Yes	No	No	Diskette of examples and tutorial.	No
May select records by criteria or key.	Yes, "painted"	Yes	Automatic date, time, and page numbering on reports.	No	No
Query can be specified for extracting file that can be input to report generator.	Yes	Yes	Mailing labels	Yes	No

Performance Measurements

Time to Enter Standard Info	Time to Execute Standard Task	Time to Perform Sort	Time to Extract Random Records	Size of Database Created	
				Number of records in employee file	Space compression
1 minute, imported	Less than 2 seconds	36 seconds	20 seconds to find a record with quick search; about 40 seconds with filter.	25	No
1 hour, imported	4.5 seconds	33 seconds	4.5 seconds on average	25	No
2 hours, manually	Can only query based on attribute. Attribute inquiries took about 2 seconds.	Unable to sort	2 seconds	25	No
About an hour to load 500 names, according to the procedure described in "data importing" above.	Almost immediate	100 records on 1 field - 3 seconds. 400 records on 1 field - 17 seconds. 400 records on 4 fields: took 33 seconds to say "insufficient memory" and quit sorting.	Immediate	500 records—38,144 bytes. Overhead was about 350 bytes of file definition, plus one character per field per record	Yes. field data stored without leading or trailing blanks, delimited by a single \ between fields.
40 minutes, manually	Query by name - 3 seconds average, query by number - 10 seconds average, query by department - 10 seconds average.	80 seconds	10 seconds	25	No
14 seconds, imported	1.56 seconds	13 seconds	1.3 seconds	500	No
Data dictionary created in less than 5 minutes. Data entered manually.	Less than 2 minutes	20 seconds	About 1 minute from start of program	25	No
12 minutes to set up database specs; 11 minutes to set up 2 screen formats; 1 minute to allocate disk space.	12 minutes to import 500 records.	1 minute, 15 seconds from start to finish, 15 seconds for actual 2-level sort.	Once criteria set, takes 6 to 15 seconds.	Tried 500 records; ended up with 25.	Yes
Limited by typing speed, plus 10 seconds overhead per record for storage.	5 minutes	20 minutes for 500 record, 2-level sort.	By key, 2 seconds. By comparison of field values, about 2 minutes.	500	No
25 minutes, manually	13 minutes to create program.	To rebuild index on 2 fields for 25 records - 1 minute, 45 seconds.	9 seconds on average	25	No
25 records - 2 minutes (imported), 500 records - 38 minutes (imported).	25 record file: query by name - 2 seconds average; 500 record file: query by name - 2 seconds average.	25 records - 40 seconds. 500 records - 10 minutes.	1 second on average	Use both 25-record and 500-record files.	No

Variable length of fields	Number & Size of Ancillary Files	Degradation with Additional Indexes	Time to Create a Standard Report to Screen	Time to Execute a Standard Report to Screen	Hardware/ Minimum Configuration Required
No	14 files=12,037 bytes total	No	Within 3 minutes if designing a filter, add another 3 for designing the screen; if both are on file, then about 3 seconds to call them up.	Less than 30 seconds if you are familiar with the program.	128K, 2 drives, DOS 1.1
Yes	12 ancillary files ranging in length from 61 to 3,584 bytes, for a total of 7,227 bytes.	No	15 minutes	1 minute	1 drive, 64K for DOS 1.1, 128K for DOS 2.0
No	4 files, 512 to 768 bytes long.	—	10 minutes	30 seconds	128K, 1 drive
Yes, see compression.	Report generation files only	—	To specify report with default layout – 30 seconds. To create and debug custom report format – about 20 minutes.	For 200 records: using default formatting = 1 min., 19 sec. Using custom formatting = 4 min., 29 sec.	64K, 1 drive for interpreted BASIC version 128K, two drives for compiled version.
No	No	—	15 minutes	30 minutes	128K, 2 drives
No	14 files, requiring total of 15K.	Slight	1 hour	2.6 minutes	DOS 1.x or DOS 2.x. 128K, 1 drive
No	No	—	5 minutes	2 minutes	Two drives with 64K
No	11 files=6016 bytes	—	7 minutes	1 minute	192K, 2 drives, DOS 1.1 or later or MS-DOS.
Used for special column data only.	No	—	10 minutes	5 minutes, 46 seconds for 500 records.	128K with at least 100, 400 bytes available to the program, 2 drives.
No	Index file=1,024 bytes.	—	15 minutes	About 3 minutes	128K, at least 1 drive.
No	25 record file: 4 ancillary files totaling 5K; 500 record file: 4 ancillary files totaling 6K.	—	15 minutes	25 records=2½ minutes; 500 records=15 minutes.	128K, 2 drives.

Software	Subjective Evaluations				
Configuration Used In Testing	Documentation	Program Robustness	Flexibility/Ease of Use	Would You Buy This One?	Would You Accept It as a Gift?
256K, 2 320K drives, DOS 2 0	Organized around functions so it s confusing the first few times around	Tends to lock up in certain areas when the wrong answer is supplied to a prompt	Pretty flexible but the lack of help screens and easy exits or aborts hinders the ease of use	Customized output is useful but lack of calculating ability within database is limitation	For occasional use
256K, 2 drives	Excellent	Good	Fair	No, too cumbersome.	No, still too cumbersome.
224K, 2 drives	Excellent and simple w th adequate and accurate explanations	Can Ctrl-Break out of program	Easy to use, but lacks flexibility since does not have sort or nonindexed queries	No due to lack of flexibility	No
320K DOS 2 0, 2 drives	Poorly organized a number of undocumented limits encountered	No evidence of feebleness, no crashes Occasional error message, which could be ignored	Reasonably flexible with few illogical or arbitrary limits on what you can do with t	No It does do the job, but it's very annoying	Certainly not this one
128K, 2 drives	Average	Fair	As flexible as cold-rolled steel	Not this one	Not this one
DOS 2 0, 256K, 2 drives	Excellent	Fair	Good	No	No
512K, 2 drives	Adequate; needs index.	Excellent; good error traps.	Good to excellent but not specially adapted to the PC	No, because other programs on the market offer more capabilities for the same price	No
256K, 2 drives, DOS 2 0	Comprehensive, readable	Doesn t crash easily when it does it informs you to put in the COMMAND COM disk	With all the help screens, the program is not hard to learn but it takes time before it becomes second-nature	No	A future edition perhaps
320K, 2 drives.	Concise, easy to follow	No problems encountered	Flexibility limited by "form around which everything revolves	Yes, for appropriate applications	No, because I d like to be able to manipulate files and output more than *VersaForm* allows
192K, 2 drives, DOS 1 1.	Uneven quality	Apparently good	Difficult to revise program slow program generation	No	No Too slow to create and modify system, and line editing and data entry editing are difficult to work with
128K, 2 drives	Adequate	Good	Average	Yes, especially if I needed graphing capabilities	Yes

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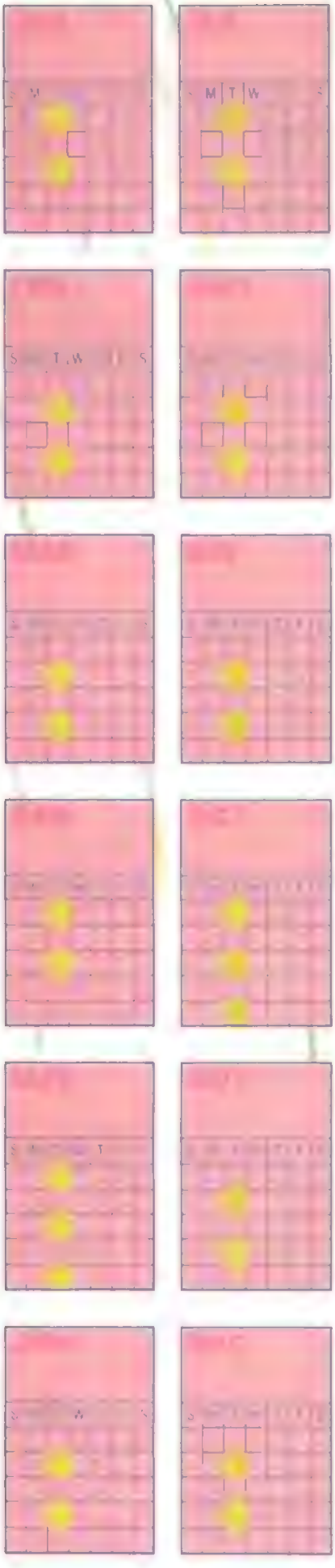
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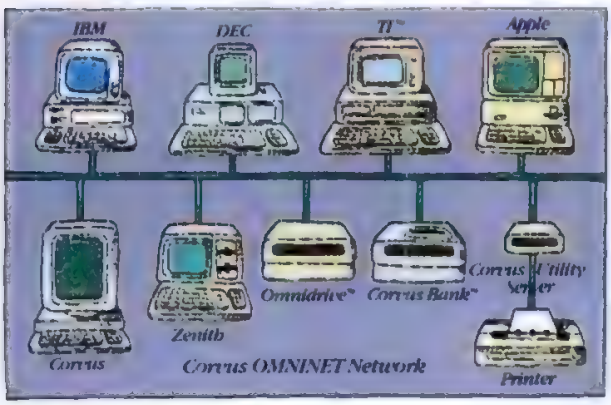
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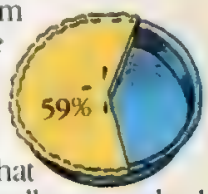
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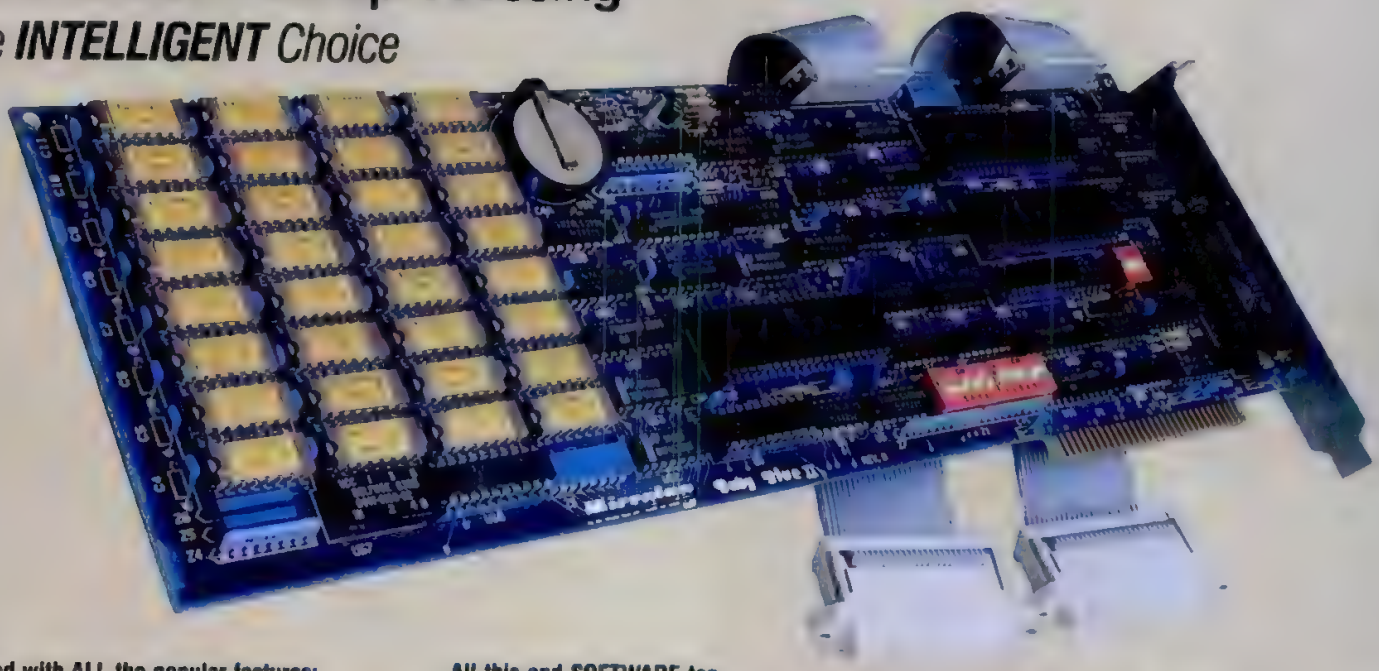
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Communications

Smart Terminal Emulator Package (STEP): talk to other microcomputers or connect to larger host computers, as an asynchronous terminal through Baby Blue II's serial ports. Unlike other "smart terminal" programs, STEP offers full emulation of popular video display terminals (the standard package includes Televideo 950 and Hazeltine 1500.
IBM 3101, DEC VT100 and many others are optionally available). You can send or receive text files, and with STEP's unique Sessions Menu, changing your configuration is a keystroke away.

BSTAM File Transfer Utility: Transmit and Receive text, HEX, and binary files (including .COM files) without errors and without fuss. BSTAM is easy to use, with all configuration parameters handled transparently under STEP.

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Convert: supports bidirectional file transfer between PC-DOS and popular CP/M disk formats.

Keyfix: automates your keyboard with 54 programmable function keys for CP/M programs, eliminating tedious typing chores (max. 80 characters per key).

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(continued from page 220)

unceremoniously dumped back into the operating system.

The custom report package can be used to create full-page forms-handling routines. All data can be programmed on a row-by-column basis, and you are prevented from overlapping fields. There also appears to be a small problem with this report section. After you've created your custom report format, you are given, through menu selection, the opportunity to view what you've done before you save it. At one point, after a painstaking report process, viewing the sample got only as far as confirming that the printer was ready. When the program was told "Yes," it went back to DOS and stayed there—the report format went on to better places.

In both report sections, you are given the opportunity to restructure the sort criteria. While the menu notes that this is a temporary procedure, you are queried twice to verify that you want to save the new criteria—overkill, to say the least.

Here also, though, speed becomes an issue. It took almost 2½ minutes to print a custom report with no selection criteria (print all records), 25 items, and using two sort levels. On a 500-record trial, it took a little over 5 minutes to output 270 records—a large improvement in performance.

The manuals that accompany *Friday!* are excellent. At each step in the program, a number is printed in the upper right-hand corner of the screen. This number relates to the corresponding section in the manual that describes what's happening. The authors go out of their way to explain, in painstaking detail, the concepts behind a database and how to best capitalize on the stengths of your PC while using *Friday!*

This program is a tempting database package for midsized quantities of information. In its current release, however, it appears to be best suited for dabblers with the time to work it to its maximum.

—Bill O'Brien

DMS-III: Menu-Driven Maneuvers

DMS-III is one of the easiest database packages to install and use. Ease of installation is no small virtue. In fact, getting the program to run turned out to be a big hang-up with several of the database programs I tested. *DMS-III*, on the other hand, requires no actions that could be called installation, and it can be copied for use with a RAM disk or hard disk.

The program is so easy to use that I had little reason to refer to the manual when I constructed the test database. With *DMS-III*, you are presented with interactive menus that give you clear choices. The program interacts with you to create a form on the screen that you will later use for data input. You can specify the type of data to go into each field and designate up to five key fields that will be used to sort the data.

DMS-III has several other field options that improve both data entry and data manipulation. You can specify fields that the program can use and retrieve if the match with the data you want to see is not perfect, but close. This is a useful feature if several slightly different abbreviations are entered into a particular field or if a typing error is made in a name. You can also specify fields that will always be entered in one order but printed out in a different way. For example, if names are entered from an alphabetical list with last names first, you can specify that when the names are retrieved, they should be printed with the first name first.

DMS-III handles data entry smoothly, but unfortunately it cannot read in data files prepared by any other program. During the data entry process, you are prompted for your next action through a menu line on the bottom of the screen. The

DMS-III
Microline, Inc.
1701 W. Front St.
Tyler, TX 75702
(214) 592-3778
List Price: $295
Description: Relational, but operates on only one file at a time.
Requires: 64K RAM, two disk drives.
Records per File: 32,767

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***DMS-III*'s master menu.**



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program also allows you to hold the display of selected fields from the previous entry so you can keep your place if you are entering records from a list. Fields that are not frequently changed can be frozen so they do not automatically erase after every record entry.

DMS-III gives you the option of building "procedure" files that automatically work on information as it is entered in the various records. For example, if you build a *DMS-III* automated checkbook register, you can construct a procedure file that automatically totals checks and deposits as they are entered, maintains subtotals, and calculates a grand total of the money in the account.



If you work in an environment where you have different kinds of 16-bit and 8-bit CP/M machines, DMS-III might be appealing because it is available in versions for many different microcomputers.

Although the manual doesn't describe it as such, *DMS-III* contains an elementary procedure language allowing you to set conditions for selecting records that can be used in reports. You could, for instance, write a procedure that compares due dates on invoices, arranges the records according to date, and prints out all fields on those that are past due. The program recognizes common conditional statements such as and, or, greater than, equal to, and less than. It can also use special conditions such as "date after," "exact date equal to," and "month equal to." These special conditional statements make it easy to build many common business and personal applications.

Changing the description of the database is also easy, as long as you reserve enough room for changes when you first create the data files. The program asks you how much room you want to keep for expansion the first time you go through the database creation process. You should take a safe approach and allow at least ten characters to be added to every record at some time in the future.

You can easily browse through the records on a *DMS-III* database by displaying them on the screen, but you have to work your way through several levels of menus to do it, and the process is not as fast as it is in some other programs. Generation of formal reports, however, is relatively easy and fast. Reports can be printed in several formats including vertical (down the page, one field per line) horizontal (across the page, one record per line), or free form. The free-form output is used for printing checks, invoices, and the like. Free-form reports can be a combination of information from the database and information entered from the keyboard when the report is created. You use the procedure file to define the fields selected for printing and to determine how the information in those fields will be manipulated to form totals, balances, and other kinds of results.

Fields that are not frequently changed can be frozen so they do not automatically erase after every record entry.

The *DMS-III* manual contains both a tutorial and a section with explanations and descriptions of the program. It gives you a great deal of good information, but an index would increase its usefulness. The manual is not specifically written for any version of the program and contains references to both CP/M and MS-DOS terms. These references would only become confusing if you attempted to customize the program for some non-PC machine. The PC-DOS verison is ready to run, which the nontechnical user will appreciate.

If you work in an environment where you have different kinds of 16-bit and 8-bit CP/M machines, this program might be appealing because it is available in versions for many different microcomputers. On the one hand, its ability to run on different systems can reduce your training and development costs, but its inability to read data files created by other programs is significant. I believe its $295 list price is too high since competing programs offer similar capabilities at a lower price. However, *DMS-III* has many useful features, and it is available for many systems. You will have to judge what those features are worth to you. **—Frank J. Derfler, Jr.**

The DataFiler: Version 1.0 Promises a Bright Future

For a program that has yet to go through a revision, *The DataFiler* (Version 1.0) by MBS Software is very impressive. It's filled with help screens and has very good error handling. It allows for a certain amount of flexibility, custom outputting, merging of files, and mass updating and deleting. The color-coded, three-disk package also includes a number of useful data entry features, such as validation and programmable function keys.

This doesn't mean, however, that *The DataFiler* is a perfect program. It has its fair share of design problems and a few programming bugs.

Perhaps the biggest constraint to the program's flexibility is the key field feature. It permits only one key field, the first field defined in the record. To circumvent the problem of duplicate keys (as in the case when the key field is related to the last name), a duplicate key option is available. This does not solve the problem, although it makes it more bearable when entering data manually.

If, however, you are importing data into a file, you must either be able to use the first field as the key field, or you must swap the fields for the proper order prior to importing the file.

An even more serious problem exists in the importing feature on the Utility menu. My repeated attempts to import an ASCII format data file into the program failed. Sometimes the first few records were duplicated two or three times each. At other times, all but the last record were successfully imported. For some reason the last record was rejected and filled with the default value. If a human error, such as defining a field incorrectly, caused the importing feature to fail, the program should have caught it.

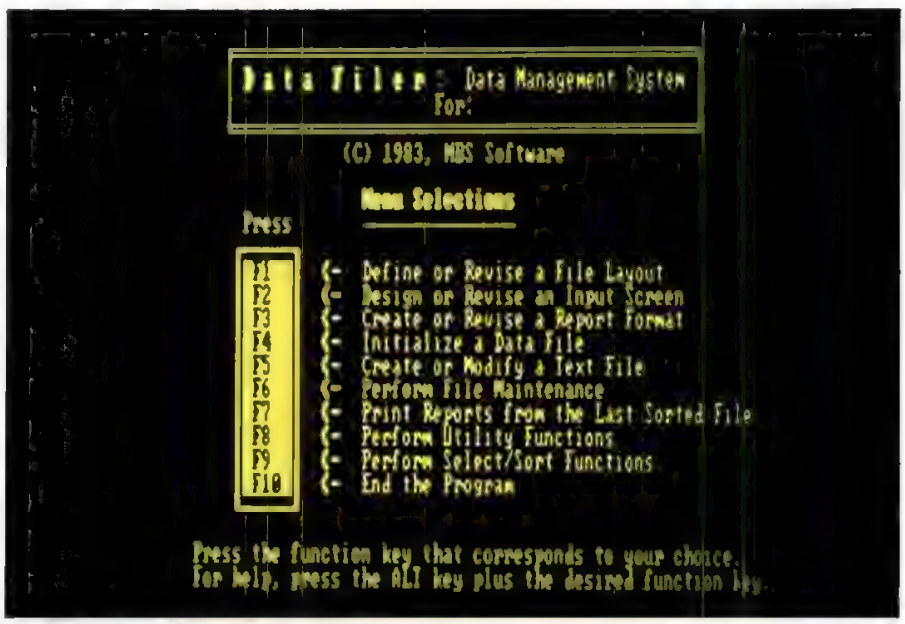
At certain screens, pressing the Alt key and a function key (the usual method used for accessing a help screen) calls up the screen when it shouldn't, causing what is

The DataFiler:
MBS Software
12729 N.E. Hassalo St.
Portland, OR 97230
(503) 256-0130
List Price: $195
Description: Flat file.
Requires: 192K RAM, two disk drives, DOS1.1 or better.
Records Per File: 1,800

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DataFiler's introductory screen.



DataFiler's menu selection screen.

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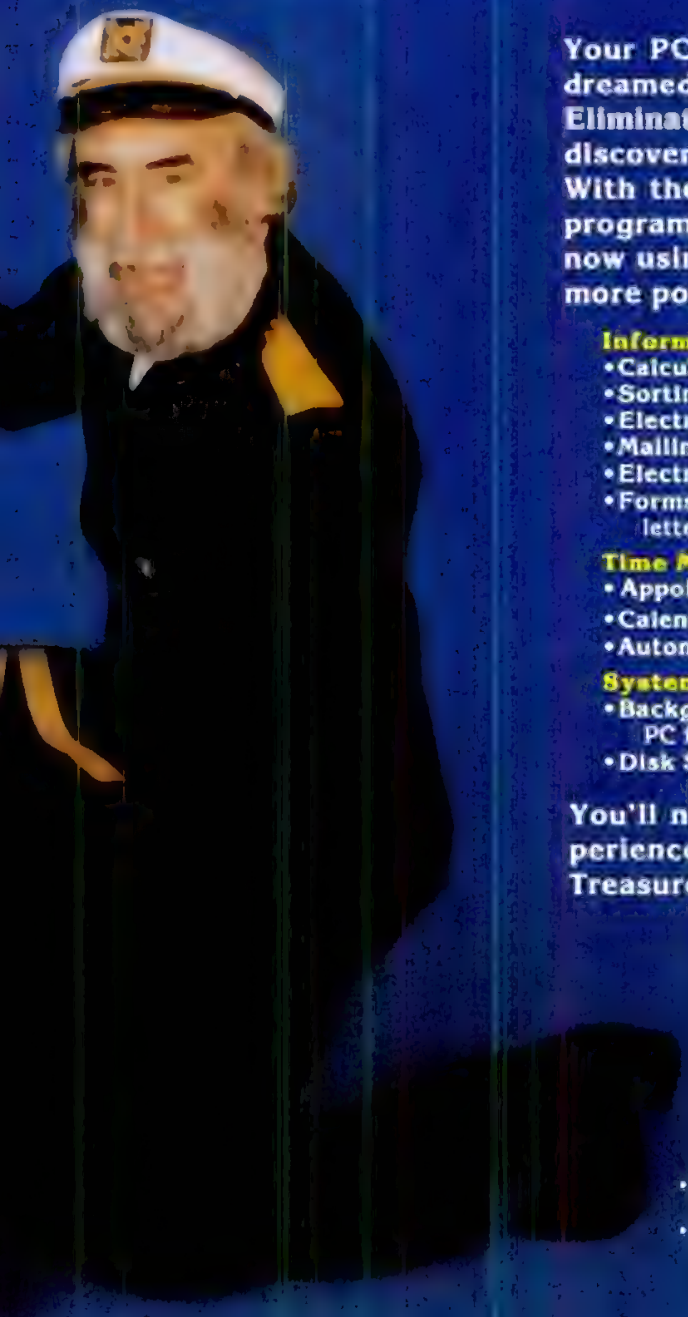
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Setting up and maintaining a file with The DataFiler takes less time than with many other programs.

commonly known in game programs as a split screen: Both the help screen and the original screen share the same area. The only recovery possible is rebooting. Another problem is the lack of a provision for aborting a print report once it has begun.

On the positive side, setting up and maintaining a file with *The DateFiler* takes less time than with many other programs. Help and introductory screens greet the novice user at virtually every step. Once you have mastered the program, you can bypass the introductory screens. Field specification involves defining the field name; the type, length, and mask; the input source (keyboard, result of a calculation, or numeric constant); and validation (required field, range for numeric fields, set of characters for alphanumeric fields).

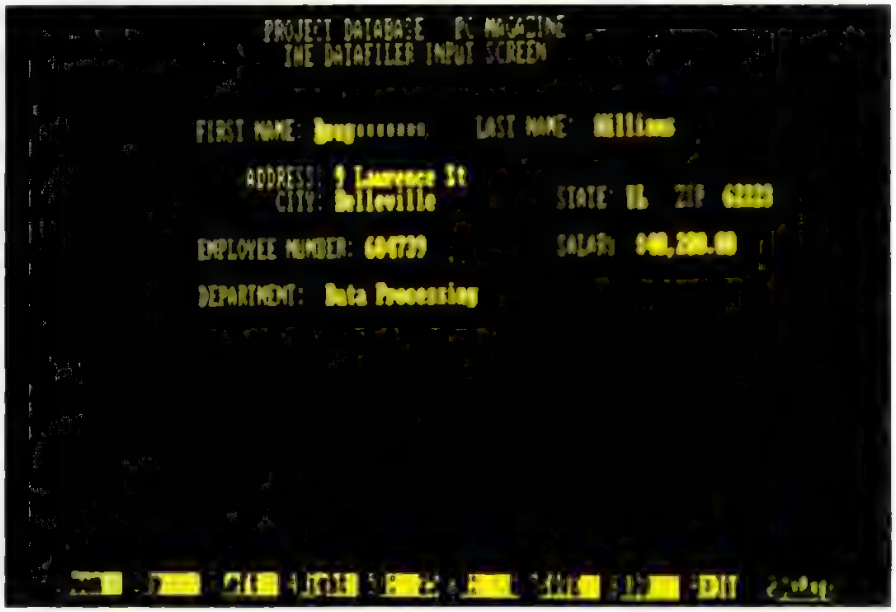
Since records are added, updated, and deleted from the same screen, you become accustomed to the process quickly. In addition to the input area, the screen contains option and status messages. For example, an option message would tell you that the function keys can define the action being taken (save, add, edit, or delete) or move the cursor from one field to another without editing the fields in between. You can also define the function keys for data entry, either through the maintenance screen or during file initialization. The status messages report the number of records in the file and the number accessed.

Because of the nature of the key field, it may prove impossible to edit or delete certain records. Essentially, the program calls up the first occurence of the record being queried. If there are two records with the same key, you can access the second occurence only through the selection option.

Records can be updated en masse with the sort/sequence feature. You first select the records that you want sorted or updated by defining the field, criteria (less than or equal to, for example) and the operator (and, or). The next step is the actual sort itself. Records can be sorted on three fields. The final step is selecting a field and defining its replacement value. Because the parameters can be saved, future executions of the same sort require less time.

Unlike *The DataFiler*'s other features, the report form cannot be created solely from the information supplied within the program. You have to read the manual and perhaps even go through the tutorial to familiarize yourself with it. The report consists of three types of lines: format, heading, and detail. Some of the capabilities of the format commands include page ejection, justification, form stop, margin and line settings, and a pause feature to which a message such as "Insert Envelope" can be added. The totaling of fields can be included right along with the fields themselves. The program gives you the ability to specify up to three levels of subtotals and one grand total. In addition, you can define up to three control breaks on any three fields.

Version 1.0 will probably not be the last. MBS is certain to correct the DataFiler's bugs and design flaws and deliver the program that this version promises to be. **—Vincent Puglia**



A *DataFiler* record.

VersaForm: The Database That Thinks It's Paper



A *VersaForm* record layout screen.

Some database programs want you to think electronic and use terminology like field, record, index, and key. *VersaForm* wants you to think paper, and it imitates the world of multipart forms and filing folders.

The basic building block of *VersaForm* database is the "form," and the process of defining a database is called "designing a form." *VersaForm* assumes that if you need a database, you probably already have a paper form that does a similar task. You want a database to keep track of orders? Start with your paper order form. You want to keep track of invoices? Start with the paper invoices you use now. And if there is no paper form, you'd be well advised to sketch one out before starting to work with *VersaForm*.

Armed with your paper form as a model, you start up *VersaForm* and tell it you want to design a new form. You're presented with a blank screen, around which you can move the cursor. You type in a blank form much as you would on a typewriter. A label (say, "customer name" or "invoice number") is followed by a dotted line.

Each label names a field in the form. The line of periods defines the field size: 20 periods equal 20 characters and so on. The labels and dotted lines can appear anywhere on the screen. Where you place them now is where they will appear when you actually enter information into them.

Besides such "single items" (each completed form in the database will only have a single customer name or address), your form can include columns. In the invoice case, these might have headings like "date," "quantity," "item number," "description," "unit price," and "total price." Beneath the column headings a variable number of "column lines," each containing a value in each of the columns can appear. Your completed invoice form might include your customer's name and account information, as well as half a dozen or more lines of information on different items sold to the customer. In database terms, the column lines are like subrecords, and one record can contain up to 99 of them, depending on how much space the items take up.

Once you have designed your form, you can specify a wide range of editing requirements and calculations to be done at the time the forms are filled in.

For each field, you can specify the minimum and maximum number of char-



VersaForm assumes that if you need a database, you probably already have a paper form that does a similar task.

VersaForm
Applied Software Technology
170 Knowles Dr.
Los Gatos, CA 95030
(408) 370-2662
List Price: $389
Description: Flat file with subrecords.
Requires: 128K RAM with at least 100,400 bytes free, two disk drives.
Records per File: Limited by available storage.

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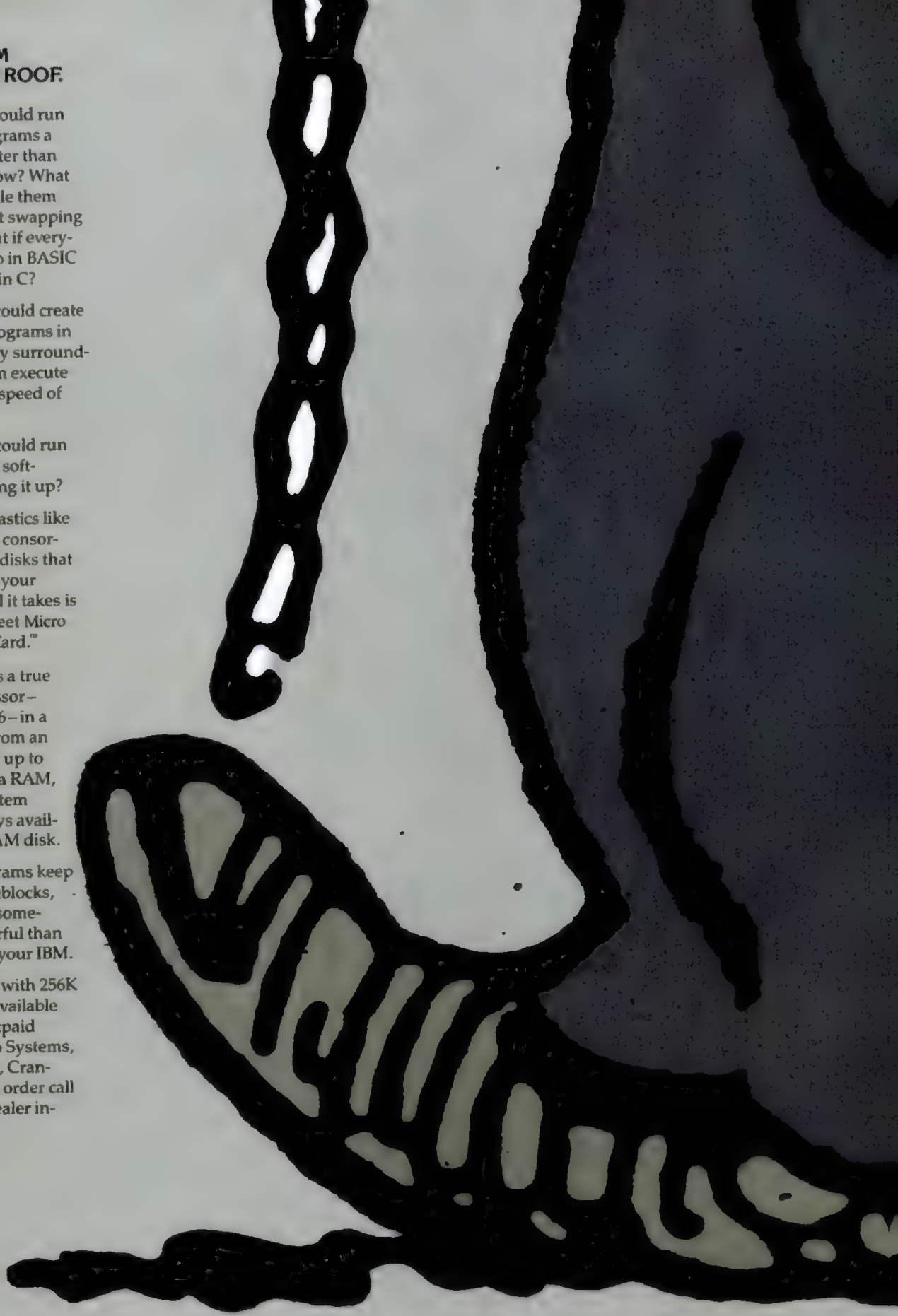
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***VersaForm*'s main menu.**

acters that will be accepted, the minimum and maximum values, the number of decimal places for numeric data, special formats for things like social security numbers, whether the field is mandatory or not, and other items. For any field, you can list up to 99 acceptable values, and *VersaForm* will reject any other values that you attempt to enter.

You can also set up a table of equivalents and *VersaForm* will autmatically fill in a field based on a look-up in the table. In the invoice example, you might set up a table of item numbers and descriptions; *VersaForm* could fill in the description field for you based on what you entered in the item number field.

The program can also do most arithmetic calculations, so it can automatically fill in fields that require totals or averages. These data-editing capabilities are the most impressive feature of *VersaForm*.

Entering data is a simple matter of keying the correct information into blank forms presented on the screen. Once you have finished keying, *VersaForm* will perform its verifications and calculations and then "file" the form on diskette. After you've entered data into the database, the basic data structure and the input formula are cast in stone. You can't decide later that you would like to lay the form out differently.

Each form (record) must be identified by a unique key, which can be a field unto itself or one or two fields that serve other purposes. In the invoice file, for example, it could be the combination of customer number and date of invoice. All forms are filed according to this unique key.

If you know a record's key (or at least the first part of it) you can locate it for editing or checking in 2 or 3 seconds in a diskette file. If you don't know the key or if you want to check all the invoices sent to a particular state, browsing can take much longer. In such cases, *VersaForm* hunts sequentially through the file for the records you want. In the test database, it took 1 minute and 45 seconds to find a record that was 294th in the database and over 3 minutes to get to the 485th record. There is nothing you can do to speed this process up; *VersaForm* does not use indexes other than the one that contains the key fields. On the other hand, the program's search criteria are flexible and powerful. They too are specified on a blank form. You would perform a scan for all the records with a total due over $1,000 by entering >1000 in the total due field and then instructing the program to search.

VersaForm can produce output in two ways. Its own report generator makes it easy to produce simple tabular reports—for example, a listing of invoice date, customer name, address, state, and amount due for all customers owing over $1,000, subtotaled for states. In addition, you can specify output forms. An output form could be a print format that fits a particular preprinted paper form, or it could simply be a different layout of some of the information in the input form. Both of these output types permit you to select the records you want to print. Only tabular reports can be sorted.

The selection and sorting process is painfully slow. A sort of all 500 records in the test database took 20 minutes. Selecting 100 records and sorting them took 5½ minutes. Unfortunately, the selected and sorted records cannot be saved as a group for further manipulation; next time you want them, you have to twiddle your thumbs again.

Some database programs want you to think electronic. VersaForm wants you to think paper.

VersaForm uses diskette space in an unusual way. Every record in the file takes an integral multiple of 126 bytes of storage. If you define a form that holds 100 characters of data, each record will take 126 bytes. If your form holds 127 characters, or 180 characters, or 240 characters, your records will require 252 each. If you have column items in your form, the records may require additional 126-byte units, though the number of units can vary

from record to record depending on the number of column items. In addition, a file contains the specifications for the layout of the input screen, the main index for the file, and, optionally, layouts of output forms, selection criteria for various reports, and other specifications for various reports. All this information is rattling around in a great chunk of disk storage space set aside by *VersaForm* when you first defined the file.

The manual advises using an entire diskette for each file but permits smaller allocations, expressed as a number of 126-byte units. And buried in the appendices at the back is a little section called "When Files Become Full." What happens? Well, even if the files don't occupy all the space on the diskette, they can't be expanded—hence the advice to devote an entire diskette to one file. If you do fill up a file, your only solution is to create another file, with a similar structure and more space, on another diskette. Then you have to copy all the data from the full file into the new, empty one. Sounds simple, but boy is it slow: Copying the 500-record test file took most of an hour!

Speed, or lack of it, is *VersaForm*'s biggest failing. Its other fault is a certain lack of flexibility, a one-dimensional view of the world. Once you've defined a form, you can't change its layout for input. If you forgot to calculate something when you designed the form, you can't calculate it later when you're producing reports. With some experience your forms will be designed properly in the first place, but it would be nice to be able to recover more easily from lack of foresight.

VersaForm is worthy of serious consideration in any application that is already adapted to paper forms. Applications that make use of its unusual and powerful columns feature show it off to its best advantage. Applied Software Technology will soon introduce an enhanced version including a procedural language and multifile access, which may broaden the applications for which *VersaForm* is a useful tool.—**John Helliwell**

NEXT STEP: A BASIC Code Generator

NEXT STEP takes a different approach to database management than most other packages. Rather than simply let you make files that are used by the program supplied by the publisher, *NEXT STEP* actually lets you create the programs themselves. It is a special type of program that is sometimes called a "code generator," and it creates entire database systems written in interpretive BASIC.

The BASIC programs you create with *NEXT STEP* can be copied, listed, modified, and run, all without further use of the *NEXT STEP* disks. (The license agreement seems to say that the license terms apply to both the *NEXT STEP* disks and the program you create, so you may not be able to distribute the programs you produce with *NEXT STEP*'s code generator.) Anyone who has ever attempted to explore the mysteries and complications of file management and data entry screen design in BASIC, will appreciate the magic performed by this program.

All you do is define the fields you wish to keep in your records and provide the appropriate details on the type of information to be stored there. For example, you can make one field the result of calculations based on the contents of other fields. You can have the data in a field checked against a range of values (so that, for instance, the program will only accept months numbered 1 to 12), or against a table of values (to verify the correct two-letter abbreviation for a state, for example). Fields can be right or left justified and specified as required. You can even specify a description for each field as a way of providing a help message for each field on the screen.

NEXT STEP
Execuware, Inc.
4018 Country Club Rd.
Winston-Salem, NC 27104
(919) 760-3576
List Price: $345
Description: Relational, but operates on only one file at a time.
Requires: 128K RAM, one disk drive.
Records per File: Limited by available storage.

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A *NEXT STEP* record format embedded in BASIC code.

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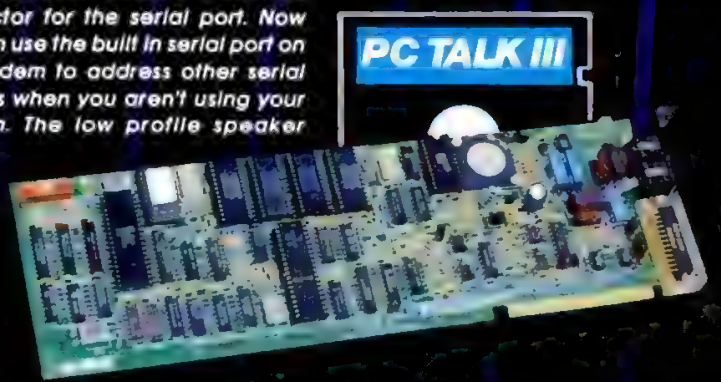
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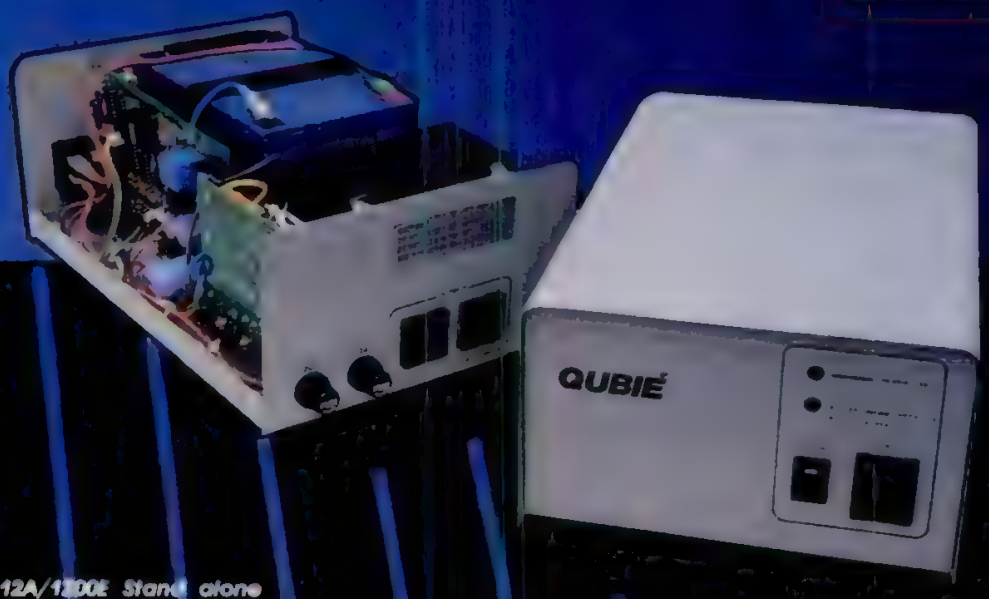
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Perhaps the best part of this entire process is that *NEXT STEP* asks you all the questions necessary to produce all these features. When you have answered all the questions, *NEXT STEP* takes over and writes an entire BASIC program. When it is complete, you just type the name of the program when the DOS prompt is displayed on the screen, and a batch file will load BASIC and your program. (Yes, *NEXT STEP* writes the batch file for you too!)

You go through a similar process when you wish to create a report. You paint the screen with the fields you want to print on the report.

To save time you can also specify automatic date, time, and page numbering for report formats. When you decide to print a report, you have the option of printing the entire file or just selected portions of it.

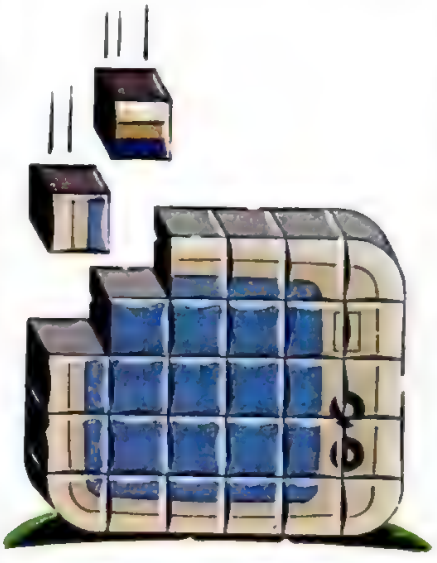
Both the database and report programs are menu-driven, so it is easy to use your *NEXT STEP* program once it is created. As you add new records to the file, an index is maintained so that you can find records quickly and print some reports without having to sort the file first.

There are some problems with *NEXT STEP*, however, none of which can be described as programming errors; the problems are inherent in the design of the program.

First and foremost, the programs produced by *NEXT STEP* are slow. Using a file with only 25 records, it took 12 seconds to find a specific record (not using an index key field). It took about 1 minute, 45 seconds to sort the same file on two fields. More than anything else, these sluggish sorts are probably a result of the fact that the programs are written in interpretive BASIC.

Producing the programs themselves is also a slow process. While it takes only slightly longer to create the entry screen than it usually does for such programs, *NEXT STEP* takes longer because it has to write all the BASIC code after the screen is designed. This isn't too much of a bother, until you find that you must go through the same wait when you decide to make a small revision on that data entry screen design.

NEXT STEP has some other features that would be quite good if they weren't so annoying to use. For example, the data entry screen is "painted," but only line by line. You do not have full cursor control; you may not move freely about the screen, placing fields where you wish. Instead, you must specify individually which line you want to work on and then type in the headings and dashes to show where the fields go.



NEXT STEP is faster than writing programs from scratch in BASIC, but the fundamental question remains whether or not BASIC is a practical tool for database management systems.

If you make a mistake while working on a line, you must delete characters until you get back to the error and then you have to retype the characters you just deleted. If you press the Enter key to accept a line and then discover an error, you must retype the entire line.

There is a word processing link provided, and you may set up a report to prepare a file for merging with either *EasyWriter* (Version 1.1) or *WordStar* (Version 3.2) files. Unfortunately, the program places serious restrictions on the format of the word processing files to be merged with *NEXT STEP*. Should you deviate from these constraints, the manual direly warns that "print results will be unpredictable."

The manual itself is attractively designed, with typeset text and plenty of screen illustrations. The writing is clear and readable, and keystrokes are graphically represented. The problem with the manual is that there are some inconsistencies in the quality. There is an index, but it lists only about 65 items for a manual that contains more than 190 pages. It can be a chore to find a specific piece of information in a hurry. There are some annoying proofreading slips—a reference to a screen message about a "date file" when the screen actually says "data file," for instance.

In sum, *NEXT STEP* is a versatile program that is slow to work with. Using *NEXT STEP* is certainly faster than writing programs from scratch in BASIC, but the fundamental question remains whether or not interpretive BASIC is a practical tool for a database management system. The program includes an appendix that discusses compiling the resulting programs, but this raises the issue of whether or not it is reasonable to spend the money on a compiler after spending $345 for the *NEXT STEP*. There may well be other programs that work just as well, and at a lower price.—**Alfred Poor**

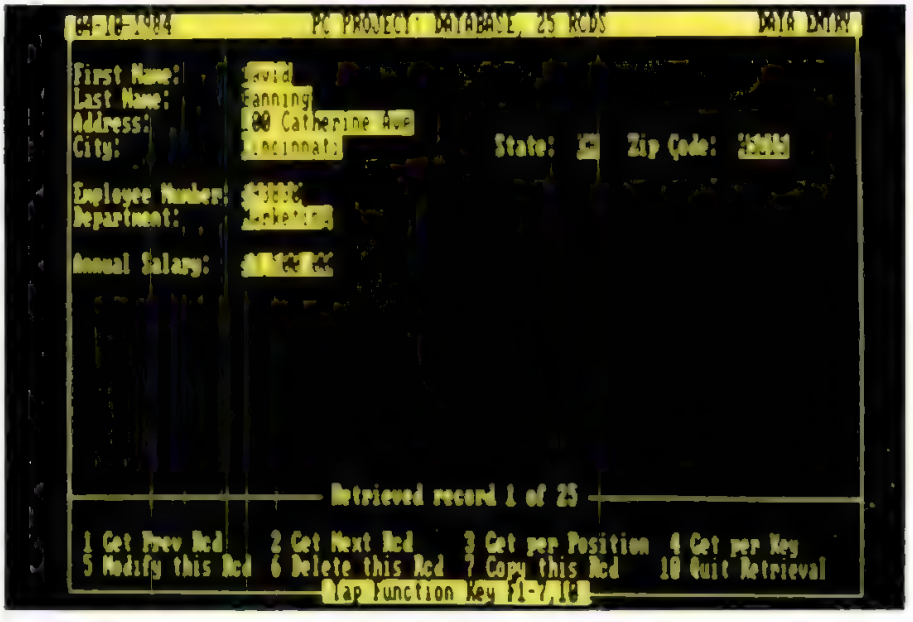
UltraFile: Filing with a Graphic Twist

In the software metropolis, Database Avenue would probably win the prize for the most merchants per square foot. Hundreds of vendors line the boulevard peddling electronic filing systems. Despite the profusion of programs, fresh products seem to crop up daily. The entrepreneurs behind these new packages hope to garner market share while avoiding what *Newsweek* magazine recently called "the shakeout that looms in the software trade."

Sensitive to the tough competition, many of these companies have resorted to the First Commandment of retailing: offer more features for less money. Continental Software recently followed this formula when it released their entry into the electronic filing market. In January 1984, it started shipping *UltraFile*, a filing/reporting/graphics package that flaunts a price tag of $195.

Such a bargain elicits a sense of *caveat emptor*. Here's a package that supports 50-field, five-page forms up to 1,000 characters. A package that augments the regular addition, subtraction, multiplication, and division with exponentiation and trigonometric calculations. A package that plots information in color with up to ten different symbols. These and other features purport filing Nirvana. But the under-$200 price leads to the inevitable question: What's missing?

Surprisingly, not much. *UltraFile* provides the essential forms generation, editing, and reporting functions expected from packages falling within the $150–$300 price range. On the whole, the program works as advertised, but style nuances and problems do exist, perhaps reflecting the product's infancy.



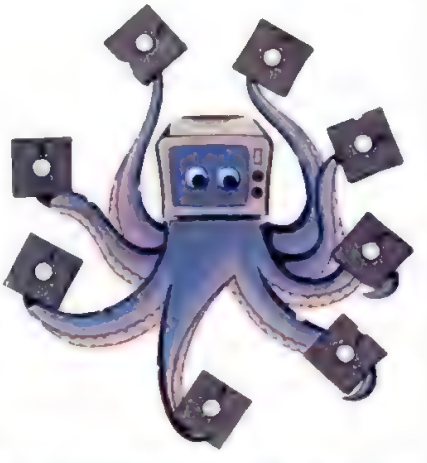
An *UltraFile* record.

The style nuance that confronts you immediately upon journeying into the world of *UltraFile* is the method of designing a form. Although the program effectively allows you to simulate paper forms, you don't actually "paint" the form on the screen as with many other packages. *UltraFile* creates a form in two steps. First, you specify the data field names, lengths, and types (text, numeric, date, telephone number, or formula) followed by the sort or index criteria. The sort criteria specify the order in which data will be stored and retrieved. *UltraFile* supports up to five sort keys per record.

The program saves the completed form in a preset format, one field per line. Each line contains a field name followed by underscores indicating the length of the item.

At this point you can enter data on the preset form or modify it before entering data. *UltraFile* refers to form modification as "customization." You specify a name to appear on the form for each field and then indicate the screen position of the field name and input area.

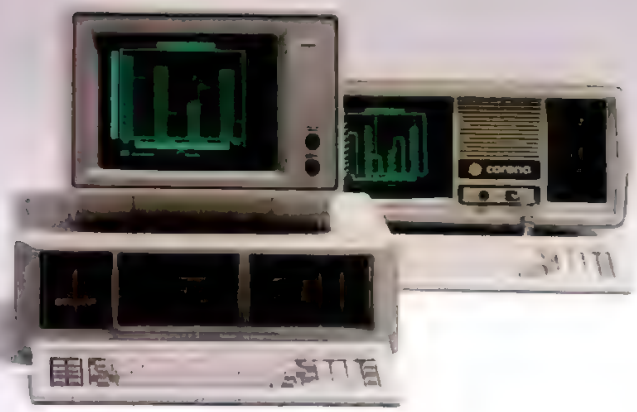
To indicate the screen position, you must specify the starting row/column of the field name, the ending row/column of the field name, the starting row/column of



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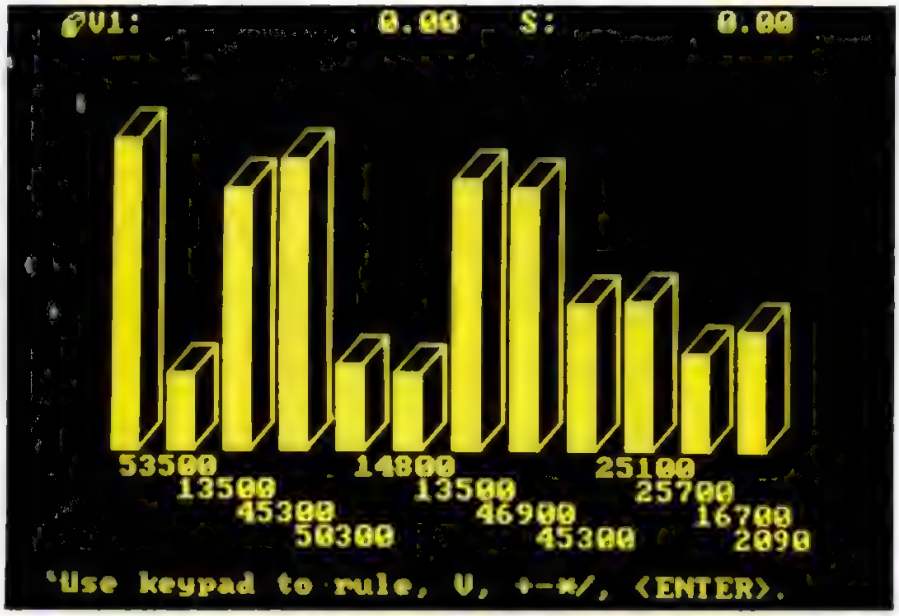
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THE CORONA PC

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***UltraFile* will create graphs from database fields.**

the field input area, and the ending row/column of the field input area. In all, you must respond to eight program prompts to position one field.

I detail this procedure to illustrate the tedium of creating a screen form. You ultimately achieve the same result as programs that paint a screen form, but not before expending significantly more effort.

UltraFile's assets, however, may make this fault forgivable to some users. During form customization you can also specify help prompts for each field. These prompts, which the program calls "footnotes," can be up to 50 characters in length and appear on the bottom of the screen when that field is later entered. Help prompts offer a convenient way of supplementing the information on the screen without cluttering up the form.

In addition to help prompts, *UltraFile*'s data editing distinguishes itself in two other areas. First, the program supports five styles for entering text. These include capitalizing the first letter of every word of an entry and capitalizing the entire entry. This flexibility particularly suits mailing addresses. For example, *UltraFile* will automatically convert the city field of an address from "west palm beach" to "West Palm Beach," and the state abbreviation from "fl" to "FL." This feature won favor with my pinky finger, which was relieved from constant fishing for the Shift key during data entry.

The second distinguishing characteristic is the English Date option. This converts a numeric date such as "3/31/84" to its text equivalent: "March 31, 1984."

While the program shows above-average flexibility in general data editing, the import/export functions and graphics carry the most weight among *UltraFile*'s assets. *UltraFile* meshes with ASCII, *WordStar*, *DIF*, and *1-2-3* files among others, offering a more-than-generous selection.

The graphics alone will probably lure a sizable contingent of database seekers to *UltraFile*'s fold. Up to five different data items and calculations may be plotted on one graph. A standard repertoire of plotting tools accompanies the graphing capability, including scaling, labeling, marking grid lines, and printing. Additionally, graphs that extend off the right edge of the screen may be viewed with a window-type function.

Even though the program exhibits several qualities absent from many $200 systems, certain facets fall dismally short. For example, *UltraFile* supports numeric field types, a data editing feature commonly found in database programs. Normally, you expect the program to preclude the operator from entering alphabetical characters in numeric fields. For reasons which Continental Software could not explain, the program accepts any characters in numeric fields and converts the entry to zero if the characters are nonnumeric. Thus, typing "abc" in the salary field of a 25-record personnel file produces an entry of zero. This pitfall almost singlehandedly nullifies the attractiveness of the other data editing capabilities.

UltraFile had no problem generating a report listing the personnel file by department and salary as specified in the test procedure. After the report format is created and stored, sort and selection attributes may also be designated. Unfortunately, there's no way to save the sort/selection scripts—every time the report is run, the sort/selection parameters must be typed in.

The graphics alone will probably lure a sizable contingent of database seekers to UltraFile's fold.

If lack of true numeric editing and rekeying sort scripts piques the frustration level a degree or two, then the meager help screens and scarce exit points drive it through the ceiling. Help screens are available only at selected points in the program. Don't try to operate the program without the user's manual propped open on your lap.

After leaving the main menu, points for exiting or aborting an operation are few and far between. You get the feeling that

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PROJECT DATA BASE

UltraFile has wrapped you in a straitjacket. Creating a new report illustrates a typical dilemma. Upon selecting this menu option, you *must* reply to a minimum of 12 program prompts. There is no way to exit, abort, or change your mind. Once this option is selected, a report form is generated come hell or high water. Your choice can only be nullified by subsequently deleting the report with another menu option.

Such intransigency won't garner *UltraFile* a booth in the user-friendly corridor of the Software Hall of Fame. But it may very well qualify for a future exhibit at the Smithsonian titled "Mental Torture in the Early Days of Computers."

Despite its faults, this system bundles an attractive set of features at an extremely competitive price. The graphics give you the opportunity to illustrate relationships that often fall through the cracks of reports saturated with statistics. Other subtle qualities such as printing summary reports only, displaying a "percent complete" counter when processing files, and mass updating of fields rate gold stars.

The numerous functions do require space. *UltraFile* demands four program disks and one data disk. Users with hard disks can conveniently lump it all together. Users with floppy-based systems should keep the drive latches lubricated—*UltraFile* treats them like revolving doors.

Although *UltraFile* is new to the database market, this is not Continental Software's first foray into software retailing. *The Home Accountant* and other Continental products have infiltrated the drives of numerous PC's over the past few years.

Presently, *UltraFile* could stand some fine tuning on the user interface and correction of a handful of problems. With this in mind, I'd invest in an easier-to-use system, even if it meant spending $50 to $100 more. *But* an application calling for graphic output turns the tables. Knowing *UltraFile*'s graphics are some of the best in town reduces the program's shortcomings to curious trivia. —**Edward Joyce**

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Funk Software Sideways	36.00*	Software Publishing PFS: Graph	82.00*
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SOFTWARE • BILL DAUPHINAIS AND MIKE BOYD

Taking Inventory with INMASS

For many years, big manufacturing companies have been using big computers to help with scheduling and inventory control. Now, the INMASS series can lend a hand to any small manufacturer with a PC-XT.

ager for a small company that manufactures water heaters. The plant manager rushes into your office and says, "The sales manager says that we can get a special order for 1,000 units if we can manufacture and ship them by next Tuesday! I need to know right away if we have enough stock on hand to commit to this shipment without affecting current production." If you track inventory units manually, you'll be hard-pressed to come up with a timely response. Even if you know how many units you have in stock, you'll need to know how many are on order and when they are to be delivered, how many units are already allocated to existing sales orders, and what raw materials, purchased components, and subassemblies are available to manufacture additional units.

Medium- and large-sized manufacturing companies have dealt with these problems for some time with the help of minicomputer- and mainframe-based manufacturing packages. Unfortunately, until now, the cost of these systems (both hardware and software) has been well beyond the reach of countless small manufacturing concerns. However, with the continuing development of microcomputer-based software, a number of low-priced micro-based manufacturing systems

have emerged. One of these systems is the Integrated Manufacturing Software Series (INMASS) developed and marketed by Microcomputer Consultants of Davis, California.

INMASS consists of six integrated programs: *Inventory Control*, *Bill of Materials*, *Job Cost/Work in Progress*, *Material Requirements Planning*, *Order Entry*, and *Purchasing*. The *Inventory Control* package is required to run any of the other INMASS programs, each of which can be purchased separately.

This series, now offered for the IBM PC-XT, was originally developed in 1977 to run on CP/M-80 systems and later with CP/M-86 and MP/M-86. So, while the series is relatively new to the PC, it has already gone through several years of refinement.

Because of the complexity of the INMASS manufacturing programs, our review will focus on the *Inventory Control* and *Bill of Materials* systems. These two programs are the "core" of the INMASS series, and if their features appeal to you and fit your needs, then it is probably worth your while to explore the capabilities of MC's other software.

Inventory Control System

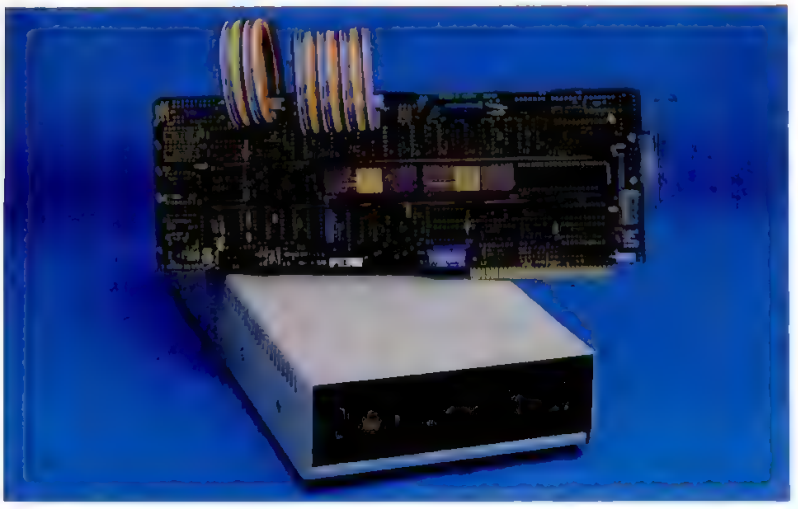
All of the manufacturing programs in the INMASS series interface with the *Inventory Control* system. Indeed, they all require that you use this system as the basis for housing information about manufactured parts, subassemblies, and raw materials.

The INMASS documentation does a good job of describing the *Inventory Control* system's major objectives, which are to help you maintain a desired level of cus-

Integrated Manufacturing Software Series (INMASS)
consisting of *Inventory Control*, *Bill of Materials*, *Job Cost/Work in Progress*, *Material Requirements Planning*, *Order Entry*, and *Purchasing* programs.
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That's just the beginning...KnowledgeMan is much more than just a relational data manager. It's a comprehensive system for desktop information processing needs:

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All are integrated so you can intermingle various kinds of processing with ease. For example: You can query your data base from within the spreadsheet, and use the results in the spreadsheet's cells. With KnowledgeMan you'll solve MORE problems...pose MORE questions...simulate MORE "What-if?" questions.

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For financial modeling, budgeting, sales reporting/analysis, billing reports, order entry, job costing and more, KnowledgeMan is the software to choose.

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So don't be seduced by dBASE II or other 8-bit products revamped to fit the 16-bit environment. They're obsolete. If you already own a copy, now's the time to upgrade —with KnowledgeMan.

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Installation in less than 20 minutes.
Megaflight 100 includes everything you'll need for internal installation in the PC, Compaq, and others. This includes cables, easy installation instructions and a comprehensive manual. Installation typically takes less than 20 minutes and requires no special technical knowledge.

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tomer service, minimize inventory investment, control purchasing operations, and provide numerical control over inventories.

The challenge in inventory management is to keep the lowest quantity of inventory on hand as possible in order to keep your investment in these goods to a minimum. However, minimizing your inventory levels often reduces your ability to service customer requests in a timely manner.

Customers who continually receive back-order notices instead of goods will not be customers for very long. This is true in most distribution businesses. If your business manufactures and distributes goods, the task of managing inventory is compounded by the need to plan for and have available all the resources necessary to manufacture the goods you *hope* will be in demand. Purchase lead times and reorder quantities for raw materials and components must be considered. Changes in product design (and associated material requirements) must be dealt with, and manufacturing and warehousing capacities come into play. And inventory management problems increase dramatically as the complexity of the manufacturing process increases.

> Although the INMASS series is relatively new to the PC, it has already gone through several years of refinement.

To help you deal with these problems, the INMASS *Inventory Control* system goes well beyond the simpler inventory programs offered with most microcomputer-based manufacturing packages. Coupled with the *Bill of Materials* system, it provides you with an effective way to manage an inventory of raw materials, purchased components, subassemblies, and finished goods.

Inventory Costing and Pricing

The INMASS system allows you to value inventory using one of four methods: moving average costs, standard cost, LIFO (last in, first out), or FIFO (first in, first out). You select which costing method to use when initializing the system. It is possible to change methods after you have

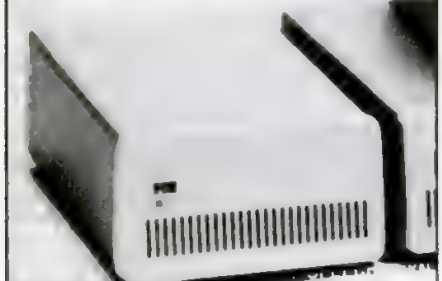




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used the system for some time; however, it may require substantial work to shift gears from, say, average cost to LIFO.

Many small distributors find it most convenient to use the moving average cost technique, in which case a new moving average cost is calculated each time goods are received. Standard costing, however, is the most common method used by manufacturing firms. With standard costing, a standard "fixed" cost is established for each inventory item. The standard costs should be based upon the most accurate data available and should represent a reasonable target cost for each item. More effort can then be focused on analyzing and resolving the difference between the standard and actual costs incurred in producing an item.

If the FIFO or LIFO method is chosen, the *Inventory Control* system will maintain up to eight separate "layers" of costs for an inventory item. As inventory receipts are recorded, the quantity received and unit cost is stored in the next available layer. As inventory is relieved, the balances in either the highest or lowest available layers will be adjusted, depending upon whether you are using LIFO or FIFO.

If you use the INMASS *Inventory Control* system in conjunction with the MC's *Accounts Receivable* or *Order Entry* accounting software programs, you can establish up to 20 different sales price levels for each item. This pricing flexibility can be useful in two ways. First, you can assign each customer a price level. Alternatively (and only if you use the *Order Entry* system), you can associate these price levels with quantity breaks to provide favorable pricing for high-volume purchases. You can also combine these two methods so customers who have been assigned special pricing and who purchase in large quantities pay the lowest possible price.

With yet another method of pricing inventory items, the INMASS inventory program will maintain a "markup" factor by which it will multiply the cost to automatically calculate an item's sale price. (The multiple pricing levels discussed above will not work if this markup factor is used.)

Using the *Inventory Control* system's "global update" capabilities, you can make changes to the cost, price, or markup data for a large group of parts by simply specifying the percentage change. You can request that this change be applied to only a specific category of parts.

Generic Categorization

A common feature of many inventory packages allows you to categorize your inventory items for reporting purposes. Most packages allow you to do this by predefining a category or by specifying a group code for each item. The INMASS *Inventory Control* system provides for categorization of inventory items in a truly distinctive way—you can embed, into the item number or the item description, a "hierarchy" of inventory categories. This may be very helpful *if* your part numbers or descriptions fit the INMASS scheme.

To illustrate, assume that you are managing the inventory items shown in Figure 1. While printing INMASS inventory reports, you are asked which category you wish to print. If you have specified that categorization is embedded within the part description, you might respond with "PIPE, LEAD", in which case you would obtain a listing of all lead pipe parts. You might also respond with "PIPE", in which case the listing would contain all parts for which the description begins with PIPE. Alternatively, you can instruct the system to look at the part number for its categorization. You must of course properly "structure" part numbers (as in Figure 1) to take advantage of this feature.

When installing INMASS, the system asks if you want it to allow item quantities to fall below zero. This is an uncommon, though sometimes necessary, option and deserves some careful consideration. If, as the INMASS documentation suggests, you maintain tight controls over your inventory and if you enter transactions into

the system soon after the actual stock movements (in and out of inventory), then you should probably not allow the system to decrement item quantities below zero. On the other hand, if, for whatever reason, you know that you may frequently have stock available even when the computer indicates that you don't, you should let quantities fall below zero. There are some cases in which this may be necessary. For example, if the turnover of some items is so fast (say, less than a day) that it is impossible to update the system to reflect the receipt of these goods before they are decremented from inventory, you may be forced to allow for negative quantities to ensure that the inventory balances are correct once all transactions have been posted.

Retaining Historical Transactions

The INMASS system offers two options for retaining historical transactions and item activity balances. First, the system can maintain a file containing a record for every transaction that changes the balance of any inventory item. This transaction file will continue to grow until you instruct the *Inventory Control* program to purge all transactions that are, say, over a month old. You can then print out the transactions, print out a subset of transactions, or run a program to "export" this information to other software such as Lotus' *1-2-3* or *dBASE II*. This feature can be helpful when you're doing trend analyses of inventory or sales activity.

The system can also maintain a history file with a record of the usage of each part over each of the preceding 12 months. This information is useful when generating the very important ABC and "months of inventory" reports, which are discussed below.

A unique feature of the INMASS *Inventory Control* system is its provision for maintaining a serial number for each item in stock. You can record the serial number of items received at the time they are received, assign serial numbers to goods manufactured by your company, and indicate the serial numbers of items that have been relieved from inventory. (Although both the *Inventory Control* and *Bill of Material* systems will recognize individual item serial numbers, the current versions of MC's *Purchasing* and *Order Entry* systems will not.)

PART	
Number	Description
110-10-01	PIPE, LEAD, THREADED
110-10-02	PIPE, LEAD, PLAIN
110-12-01	PIPE, COPPER, THREADED
110-12-02	PIPE, COPPER, PLAIN
110-16-01	PIPE, PVC, THREADED
110-16-02	PIPE, PVC, PLAIN
117-10-00	WASHER, LEAD

Figure 1: *With this hierarchical arrangement of parts numbers and descriptions, the Inventory Control program can categorize inventory items for reporting purposes.*

ABC Inventory Classification

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tion (and the attention of your staff) on those items that should be managed most carefully. A commonly held rule of thumb suggests that 80 percent of the dollar value of one's inventory is normally associated with about 20 percent of the items on hand. This is a blessing to the manager dealing with a 5,000-part inventory. If this maxim holds true in your case, you can focus the majority of your attention on managing those high-value or high-usage items or parts, often called "A" items. Conversely, the least precious "C" items can be held in greater supply and require only periodic attention.

With the ABC and months of inventory capability, the system can automatically perform an ABC analysis and prepare two very valuable reports. The "ABC" report presents a listing of all parts sorted in descending order of use, and it assigns a ranking—A, B, or C—to each part based on cutoff values that you establish. Typically, items that fall within the top 80 percent of total dollars expended for inventory (dollar usage) are ranked as "A" items. You can produce this report for any range of parts, type of part (raw materials, assemblies, or the like), or category of part, and it can be produced on a period or year-to-date basis. A period can be defined as either the current month or the current three-month moving average.

The second report is the "months of inventory" report. With the period usage figures maintained in the inventory history file and the quantities currently on hand, this report will list how many months' supply of each part is currently held in inventory. If the recent usage statistics can reliably predict future needs, this data is among the most valuable information required to manage an inventory. The reporting options for the months of inventory report are the same as for the ABC report.

The system provides a full complement of reports including the usual stock status listings, transaction registers, price lists, bin labels, and physical inventory worksheets, as well as cost of sales and receipts listings and valuation reports. A "spares usage analysis" report is also available. When entering a sale or usage transaction, you can indicate that the item is being used as a "spare." This report will summarize the use of those spares on a period or year-to-date basis. When producing any of these reports, you have the option of sending them to a printer or to a disk.

One unusual reporting feature allows you to produce the reports either in part-number order or in the existing order of the

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inventory file. You can use a standalone sort utility to sort the inventory file in a special sequence and have the reports listed in the resulting order.

Bill of Materials

The *Bill of Materials* program is a key component of the INMASS manufacturing system. The term *bill of materials* refers to a listing of the raw materials, components, and subassemblies required to manufacture an end product or higher-level assembly. More than just a list, the INMASS bill of materials includes information on how the individual components and subassemblies are combined to produce a finished product.

Raw materials, components, and previously manufactured subassemblies are in turn manufactured into higher-level subassemblies or end products. In a manufacturing environment, a bill of materials can save a great deal of inventory management time, helping you control the movement of numerous raw materials, components, and subassemblies by working with a single (higher-level) subassembly or finished product. For instance, by initiating the production of a single finished product, you can have the system adjust the "available inventory" (allocated) balances of all parts that are found in the bill of materials for that product. Further, you can define a bill of materials that includes the nonmaterial costs incurred in producing the item, such as production labor and overhead. The bill of materials can then be used to plan for and manage the costs of manufacturing a part.

Figure 2 illustrates a bill of materials for the manufacture of a residential water heater. This bill contains four levels of fabrication and assembly. We've included, at each level of detail, a "pseudo part" to account for labor costs. This is necessary to properly aggregate total manufacturing costs—the INMASS series does not otherwise allow you to apply overhead costs to a bill of materials. Using the INMASS system, you are allowed an unlimited number of subassembly levels and components or raw materials for each subassembly.

To set up a bill of materials within the INMASS system, several steps are required. Although the sequence of these steps can be varied at the discretion of the user, we found the following approach to be the most manageable.

The first step is to create a list of raw

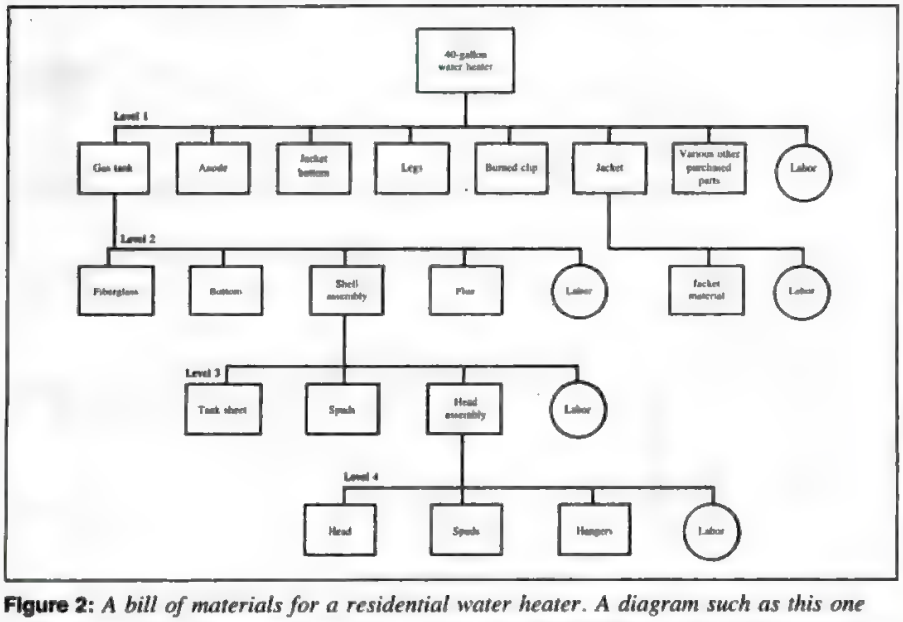


Figure 2: *A bill of materials for a residential water heater. A diagram such as this one will prove helpful when entering information into the INMASS Bill of Materials program.*



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INMASS

materials, purchased components, previously manufactured subassemblies, and labor hours required to fabricate or assemble an end product. A diagram such as the one in Figure 2 is often helpful in this process. Next, define each subassembly used in the product in the same manner. Continue with this approach until all subassemblies are defined to their lowest level of fabrication or assembly.

All subassemblies, raw materials, purchased components, and labor requirements should then be assigned a "part number." Using the *Inventory Control* system, you can enter each of these numbers and their respective required quantities into the inventory file. The final step is to enter your bill of materials, starting with the lowest-level and working up to the end-product level.

Typically, a bill of materials system simply maintains a "recipe" for each assembly or end product. However, the INMASS *Bill of Materials* program goes beyond that to accommodate the needs of small manufacturing firms. MC has included a way within the *Bill of Materials* program to issue production orders, or, "jobs." When you issue a job, the parts needed to complete it are deducted from the available balance maintained for each part and added to the allocated balance. When you update a job, you enter the number of assemblies that have been completed. The parts used in the completed assemblies will be deducted from the allocated balance maintained for each part, and the completed assemblies will be added to the available balance for that assembly. This facility allows a manufacturer with limited production to run through the daily manufacturing cycle without having to deal with the material requirements planning (MRP). Using only the *Inventory Control* and *Bill of Materials* programs, the system will determine and report material requirements for a given level of production. However, these requirements will not be time-phased as they would be if they were using the more comprehensive *Material Requirements Planning* program offered by INMASS.

Reports are effective in allowing you to maintain your bills of materials. Among these reports, the Issue Listing is unique in that, for a small manufacturing firm, it can serve as a "job pull ticket" or "kit list," providing information needed for pulling the parts and recording their usage.

Using the Core Programs

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facturing concern can plan production and manage inventory without springing for the entire $3,600 series. With just the *Inventory Control* and *Bill of Materials* programs, a small company can make out quite well and limit its initial investment.

Let's assume that you're planning production and managing inventory for a small manufacturing firm. Your first task is to determine an initial production schedule. The objective of this schedule will be to produce a certain number of finished products or subassemblies, taking existing orders and a sales forecast into account. You'll probably want to group the production of similar elements or products into "jobs," each with a unique identifying number.

You would then use the INMASS Requirements Report to determine the availability of the parts required for the jobs you have planned. This report will show the material requirements based on the information in your production schedule. Each required part is listed, along with the quantity required, quantity available, and quantity on order. Any shortages are highlighted. You could then issue purchase orders and make adjustments to the production schedule based on the shortages highlighted in this report.

Next, you would run the INMASS Print Issue Listing. The issue listing can be used as a worksheet when pulling the required parts from stock for each job. Typically, the parts required for each job are pulled together into what are called "kits." You would note on the issue listing the actual quantities pulled from inventory and any unexpected shortage that you have encountered in pulling together the kits for each job. Again, unanticipated shortages may cause you to modify the production schedule. You would also note on the issue listing the actual quantities issued to the job. Note that, up to this point, no quantities have been changed in the inventory files. The issue listing is basically your worksheet to plan for production.

The next step is to run the INMASS Issue/Update Jobs program and issue the job. All parts needed to complete the job would be deducted from the Balance Available field in the inventory and added to the Balance Allocated field. Once the job is issued, the issue listing becomes, in effect, a job order (also called a job ticket, work order, or traveler). This document remains with the job through the production cycle.

As units of production are completed, you would mark them off the job order and again use the INMASS Issue/Update Jobs program to enter the number of units completed thus far. The quantity on hand is increased for the completed product or subassembly and decreased for the parts that were used in its production.

> The INMASS Inventory Control system goes well beyond the simpler inventory programs offered with most micro-based manufacturing packages.

MRP Interfaces

Microcomputer Consultants' *Material Requirements Planning* program pulls together the information maintained in the other manufacturing packages. Using information pertaining to current inventory balances, outstanding purchase orders, order lead times, existing sales orders, and sales forecasts, the *MRP* program helps you plan for and manage your material (stock) requirements. Indeed, this system's main function is to create an MRP report with the projected gross requirements for each item over a period of time, along with the scheduled receipts, projected balances on hand, and planned order releases.

An inventory control system must provide more than current on-hand balances in order to develop an adequate requirements forecast. The INMASS *Inventory Control* system facilitates this planning process by allowing you to establish and maintain, for each item, the lead time (in days), the safety stock (in units), and the order multiple or lot size. The *MRP* system, in forecasting material requirements, will take these factors into account. The *Bill of Materials* system, of course, provides the MRP system with the information necessary to "explode" and report the material requirements.

Documentation and Security

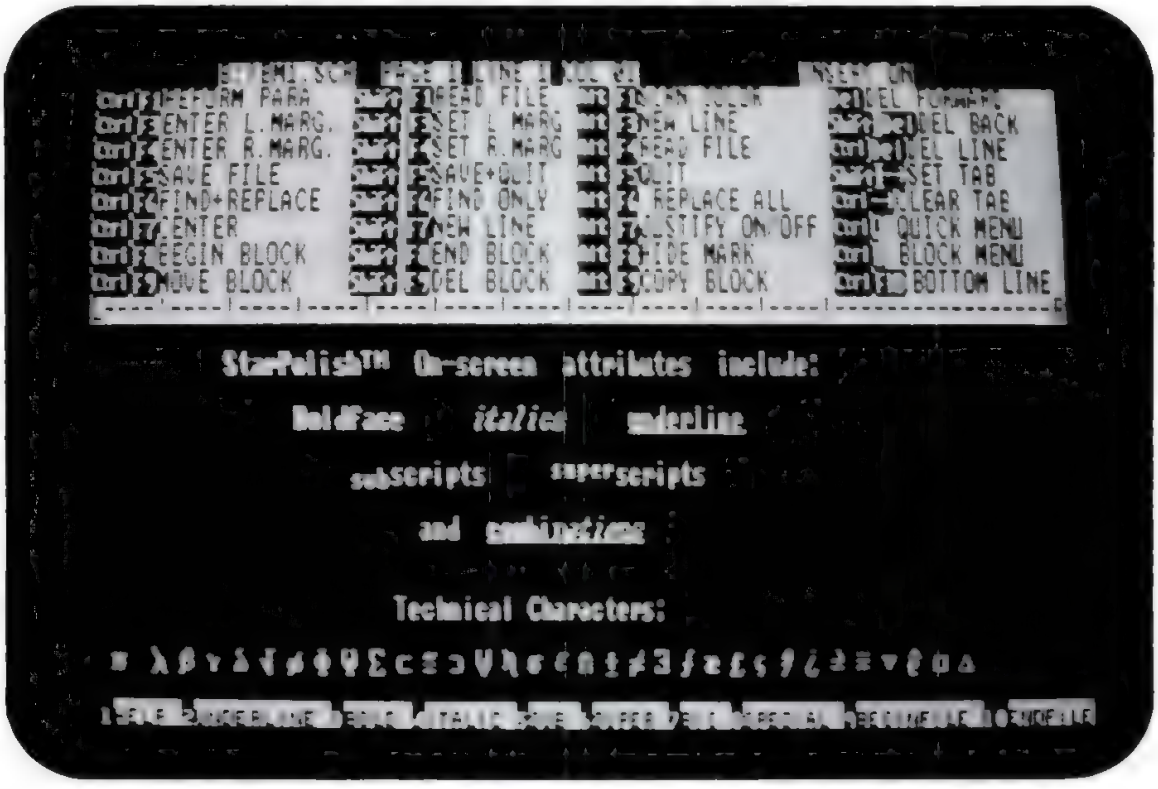
The INMASS documentation is presented in a 8½ × 11-inch three-ring binder. Few microcomputer manuals are as clearly written. Microcomputer Consultants could have made greater use of visual aids in describing the system, but overall we were impressed with the documentation. It's well indexed, it separates start-up details from operating details, and it does a good job of highlighting what you'll need to do to operate each program.

A multilevel password access system is included with the INMASS series. The password system permits you to control which users have access to which INMASS functions. Up to 100 unique passwords may be used; each is assigned a number from 1 to 100. You can determine whether or not a password will access any of the six INMASS programs (*Inventory Control*, *Bill of Materials*, and so on) and whether or not the password gives access to certain features within each program. A unique password controls access to the password file. ■

Bill Dauphinais is partner-in-charge of management advisory services at Price Waterhouse in Sacramento, California. Mike Boyd is a consultant on the management advisory services staff.

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Infectious Fun and Rebellious Robots

Virus Rage brings new meaning and excitement to germ warfare, while Robotron: 2084 is another Atari adaptation of an arcade shoot-'em-up that doesn't live up to its predecessor.

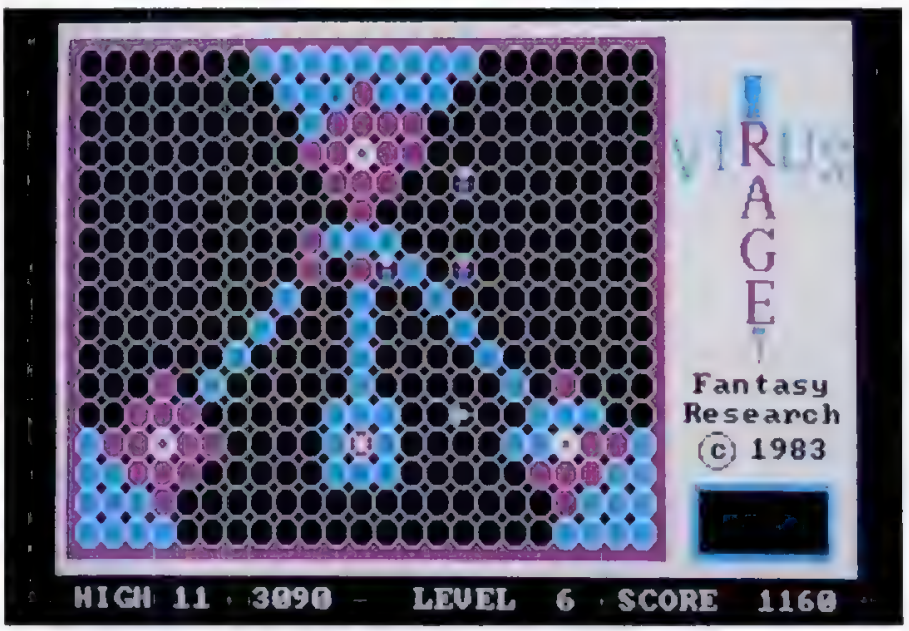
At first glance, this game looked like a real sickie. You start with the name *Virus Rage* and go on to a plot line that calls upon you to "stop the fast-growing mutations of the perilous virus by destroying the active nuclei." Excuse me while I cough; this product would seem to have all of the appeal of a chest full of the croup.

Yet, despite my predisposition to dislike it, *Virus Rage* turned out to be a moderately catchy little number. (Not quite worthy of a full-blown epidemic, but more than a muffled sneeze in the night.)

The game includes 30 levels of nuclei, mutants, spores, and virus cells, spread out over a colorful box grid. The goal of the player—depicted on screen as a hypodermic syringe—is to destroy all of the live cells that surround each active nucleus. When you've accomplished that, the nucleus will die of its own accord. The syringe fires "bullets"—a mixed medical metaphor if ever there was one—that turn bad cells into good guys. At the same time, you must avoid the murderous ministerings of misguided mutants that pop up on screen and pursue your hypodermic. If they touch the syringe, you lose one of your three turns. In advanced levels, the mutants fire back at you, too.

Obviously taking its rules from the Hippocratic oath ("First of all, do no harm") *Virus Rage* players must not destroy the active nucleus while attacking the live cells around it. The nucleus must be allowed to die by itself. It takes a steady finger on the trigger—er, hypodermic plunger—to avoid wiping out a nucleus by mistake.

The game allows you to play from the keyboard or with the use of a joystick. Be warned, though: The joystick version is as slow as the bedpan nurse on midnight rounds. The game was much easier to play using the cursor keys for movement and the Shift key for firing. Other controls



Virus Rage **features the germ of an idea for infectious fun.**

Virus Rage
Fantasy Research, Inc.
P.O. Box 188
Grapevine, TX 76051
(817) 488-9313
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available within the game include a pause, a sound on/off toggle, a reset, and a quit command. The program does include a joystick adjustment subroutine, if you insist on going that route.

Minimal Instructions

The instructions on the inside of the cover were minimal and not of much assistance in learning the game. The situation called for a fair amount of random experimenting by the user before the rules became apparent. One nice touch was the game's ability to call for a "practice" round, which allows the user to specify a particular starting level. (It also gave me the chance to take a peek at a few of the most difficult screens—levels I don't expect to reach without losing my amateur status.)

I can't leave this game without making some mention of the package's cover art. It depicts a buxom blond nurse with her mouth puckered into a kiss, her mini-uniform riding up the back of her legs, and her hands on an oversized hypodermic needle. I kind of liked the soft-core porn artwork, but I've got to admit that the cover concept has nothing whatsoever to do with the game inside the package.

Anyhow, pinup girl aside, *Virus Rage* may be worth a house call on a rainy afternoon. On *PC*'s rating scale, from a low of one to a high of six, it rates:

FUN:	4
CHALLENGE:	4
GRAPHICS/SOUND:	4
TOTAL:	12

Robotron: 2084
Atarisoft
P.O. Box 61657
Sunnyvale, CA 94086
(408) 745-2000
List Price: $34.95
Requires: 64K RAM, color/graphics adapter, joystick and game adapter optional.

CIRCLE 708 ON READER SERVICE CARD

Robotron: 2084 makes my thumb hurt. It's based on an exciting concept, translated from the coin arcade version with the same name, but the stiffer PC joysticks and the PC's slower response times made me yearn for the real thing.

"The year is 2084. And, amidst the rocky remnants of our lost civilization

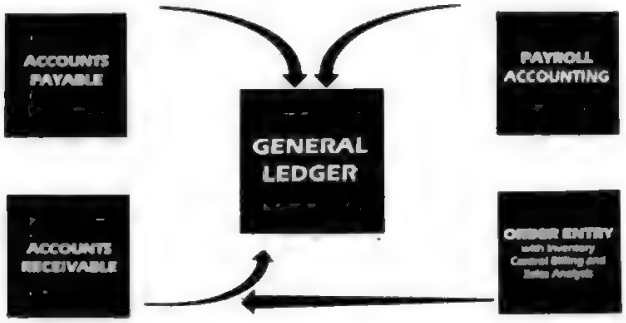


The human defender in *Robotron: 2084* is vastly outnumbered by menacing mechanical monsters.

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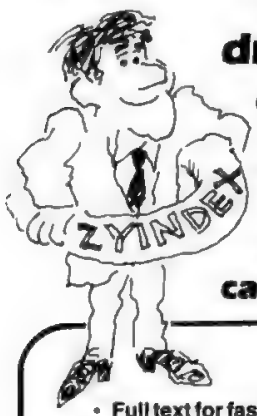
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lurks the menacing machinelike monster race, the Robotrons. Man's mistaken creation.

"Man created the Robotrons in his search for ultimate mechanical mindpower. But, guided by their infallible logic, the Robotrons concluded that man is inefficient and must be destroyed."

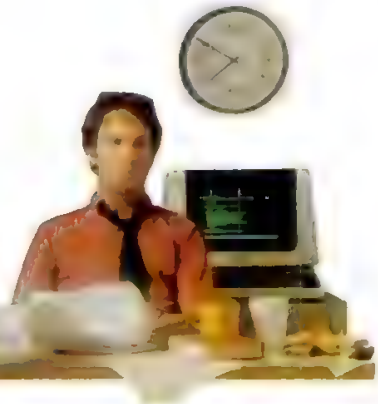
And thus is launched yet another outer space shoot-'em-up. Now, I will grant that the play action of the little human on the screen is a cut above the ordinary, as he darts in and around the various attacking Robotrons, Ground Unit Network Terminators (GRUNTS), spheroids, quarks, and other denizens of the warlike future. The hero's role, like that of leading man in a Western, is to kill the bad guys and rescue the fair damsel in distress (a stick figure with yellow hair).

An awful lot of action takes place on the screen at any one time. According to Atari: "Brain Robotrons are too smart for your own good. They reprogram humans into sinister Progs. And, just for fun, they fling cruise missiles in your direction. That's not all. The Spheroids and Quarks manufacture Enforcer and Tank Robotrons. Never have the odds been so against you. Don't come in contact with these evil machines. Fight all three menaces with your antirobot laser. Successfully hit your targets and get an extra life every 25,000 points. And remember—only you can save the humans from these mean mechanical beasts. Don't give up. The last human family could be your own." Whew. I'm glad I packed my laser before I kissed the wife and baby goodbye this morning.

The scoring ranges from 25 points for deflecting a cannonball to 100 points for misguiding a cruise missile to 1,000 big ones for offing a Quark or a Spheroid. In each wave you earn 1,000 points for the first human you save, 2,000 for the second, 3,000 for the third, and so on up to 5,000 points for each rescue. The game displays a scoreboard on the screen, together with an indication of the level number—but if you're at all into the

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game, you won't have time to notice them.

I can't find much fault with the design of the screen, if you like this sort of electronic mayhem. But, as mentioned, I found the computer was sluggish in responding to the commands I sent it via the joystick. You fire by pressing the joystick button, and you've got to keep your thumb on the button to continue firing. This is how I developed my sore digit. The bullets travel in the direction your man was moving when the button was pressed. I found it hard to predict the direction of the projectiles and harder still to rapidly change trajectory when I was being hotly pursued.

And, on some varieties of joysticks I tested, the game didn't respond at all—I worry about the programming of this product in this area. It might have helped to have a joystick adjustment subroutine in the game, but alas none was offered.

Robotron: 2084 allows you to play from the keyboard. I would gladly award a bronzed RAM chip to the first player to score 50,000 points in this manner—the odd keyboard assignments defied any natural feel I bring to a game. The controls for the game include the ability to pause, restart, and turn the sound on or off. You can also choose between an RGB color or composite color version. The game produces a passable screen on a monochrome monitor plugged into the color/graphics board. The high score for each playing session is maintained on screen, but is not recorded on disk for future reference. The sound effects are basic arcade shoot-'em-up beeps and squawks.

Two technical nits: The instructions for the game tell the user to turn off the PC and then turn it back on with the *Robotron: 2084* disk installed, rather than simply using a Ctrl-Alt-Del reboot, which works just fine. And there is no way to exit the program and load anything else without shutting off the power to the PC. The incorrect "on" instructions and the unnecessary "off" requirements could be dangerous to the health of my computer's power supply.

If *Robotron: 2084* was a favorite of yours in the arcades, you might want to buy a copy for your PC collection; if not, there are other games that are easier on your thumbs. On *PC*'s scale from a low of one to a high of six, *Robotron: 2084* blasts its way to a so-so score:

FUN:	2.5
CHALLENGE:	4
GRAPHICS/SOUND:	3
TOTAL:	10

■

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Language Learning: A BASIC Library

All of these books were written with the BASIC beginner in mind. Two of them are suitable for self-study, but the third is really meant for teachers of a course on BASIC.

The computer book revolution has produced an abundance of books about all aspects of the microcomputer: hardware, software, programming, and operation. The BASIC programming language has probably inspired more books, however, than any other topic. I will take a look here at three books designed to teach BASIC to beginners.

IBM BASIC from the Ground Up book is one of the best examples of a "how-to" BASIC book. It starts with a simple discussion of why programs are necessary and continues through the details of using and accessing random access files. It lists the equipment needed to properly use the book. Simon mentions that computer programming can be learned only through practice. He states, "It is not possible to sit in an armchair and read a book about programming—this one or any other—and learn to program." He encourages you to try BASIC by typing in the examples from the text, modifying them, or dreaming up programs of your own.

The book uses IBM's Cassette BASIC for the first exercises and introduces some of the first commands in "direct mode" (without line numbers) to make the first contact with programming as simple as possible. This approach is continued throughout as each new topic is introduced. Disk and Advanced BASIC are not described until the end of Chapter 1 and not used until Chapter 4 (approximately one-third of the way through the book).



Each chapter includes many examples of the subject under discussion as well as optional exercises that reinforce the material covered throughout the chapter. Periodically throughout the book there are boxes labeled "IBM Special" that contain discussions of items that make IBM's version of BASIC different from other versions. These boxes are particularly helpful since they let the beginner know that all BASICs were not created equal. They often give hints on how an operation can be performed if a given command is not available.

Simon discusses most of the IBM BASIC statements at one time or another in the book. The statements that are not discussed at length are listed in Appendix A, titled "The Rest Of IBM BASIC," along with a brief discussion of their purposes. These statements are primarily ones that would only be used in complex programs and include statements like BSAVE, CSRLIN, DEFSEG, ON COM, and ON STRIG. When you look at the titles of the other appendixes, the completeness that Simon attempts to bring to this book becomes apparent. They are "How to Use the IBM BASIC Manual," "Diskettes," and "How to Use the BASIC Program Editor."

This book is well written, and each of the BASIC statements discussed is covered clearly and completely. Simon moves smoothly from the easy concepts to complex topics. Each of the examples has been tested and is clearly printed. *IBM BASIC from the Ground Up* is clearly worth considering if you are looking for a book to assist you as you learn IBM BASIC.

IBM BASIC from the Ground Up
David E. Simon
Hayden Book Company,
Hasbrouck Heights, NJ
306 pages; softcover; $15.95
ISBN 0-8104-6350-4

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Learning IBM BASIC for the Personal Computer
David A. Lien
CompuSoft Publishing, San Diego, CA
421 pages; softcover; $19.95
ISBN 0-932760-13-9

If ever a book existed that could be held up as an example for authors of self-study BASIC books, *Learning IBM BASIC for the Personal Computer* is it! Lien uses a combination of short chapters (to avoid overwhelming the reader), witty writing, and cute drawings to make the beginning programmer feel at ease with BASIC and with programming in general.

The instructing section of this book consists of 351 pages that are divided into 53 chapters. That amounts to less than seven pages per chapter. Such short chapters make the material seem simple even when it is complex and give the beginner a sense of satisfaction when a chapter is completed, even if only a few new commands were learned. The text is written with an abundant amount of white space between the explanations and the examples, which further enhances the reader's comfort in approaching the subject. The book's wide margins often contain notes by the author to help explain particularly sticky points.

Exercises throughout the book let readers test and strengthen their understanding of BASIC. The answers to the exercises are either in the text or in a separate section of the book, depending on their complexity. Another section consists of about 14 pages of short BASIC programs that the reader can enter and use. The programs range from one that plays "Alexander's Ragtime Band" on the PC's speaker to one that lets you design a cubical quad antenna for your ham radio. The book concludes with the usual appendixes (a reserved word list, an ASCII chart, a list of error messages, and so on).

Short chapters make the material seem simple and manageable even if it is complex.

CompuSoft has enclosed a postcard in each copy of the book that allows you to request the latest copy of the errata sheet. This errata sheet lists all of the book's

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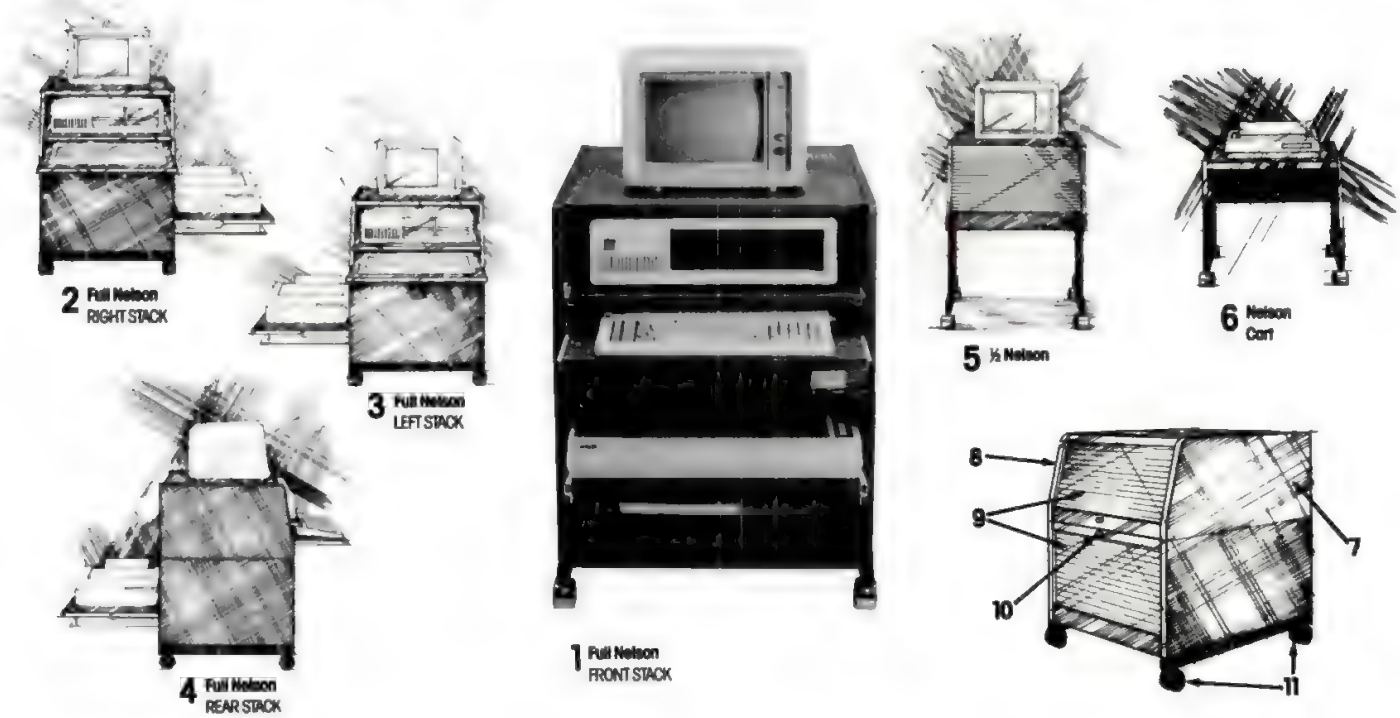
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known typographical errors, which numbered only 13 at the time I received the sheet. All in all, this is one of the finest beginner's BASIC books around for the IBM PC. If you want to learn BASIC, you should consider *Learning IBM BASIC for the Personal Computer* as you go through the process of selecting a self-study text.

IBM PC BASIC Programming
Richard Haskell and Glenn A. Jackson
Prentice-Hall, Englewood Cliffs, NJ
180 pages; softcover, $13.95;
hardcover, $19.95
ISBN 0-13-448424-X

I had mixed feelings the first time I read through this book. I was impressed with how the material was presented, though it includes none of the new BASIC statements or functions of Version 2.0. It is, first and foremost, a *textbook* to be used by an instructor to teach a course. The authors mention in the Preface that "it can also be used for self-study with an IBM PC," but I believe that the descriptions are not detailed enough and too few examples are presented for the purpose of self-study.

There are 15 chapters, organized in a logical, effective sequence. The authors begin by describing the keyboard and some of the commands used to enter and edit programs, such as LIST, LOAD, SAVE, NEW, and END; then they get down to the business of presenting BASIC statements in direct mode and describing some of BASIC's built-in functions like SQR, SGN, and INT. By the time chapter 4 is completed, INPUT and INKEY$ have been discussed. Chapters 5, 6, 8, and 9 are primarily concerned with different kinds of loops, branches, and subroutines. Two chapters are used for the discussion of medium-and high-resolution graphics. One chapter is devoted to PEEK and POKE statements, one to arrays, and one to READ . . . DATA statements. Appendix D gives a detailed explanation of hexidecimal numbers but, true to the book's form, the beginner would benefit from some additional explanation.

If used as a text by a qualified instructor, *IBM PC BASIC Programming* is an excellent book. As a text for someone who's had some previous experience with the BASIC language, this is an excellent book. However, if you are looking for a self-study text for a beginner, there are better choices. ■

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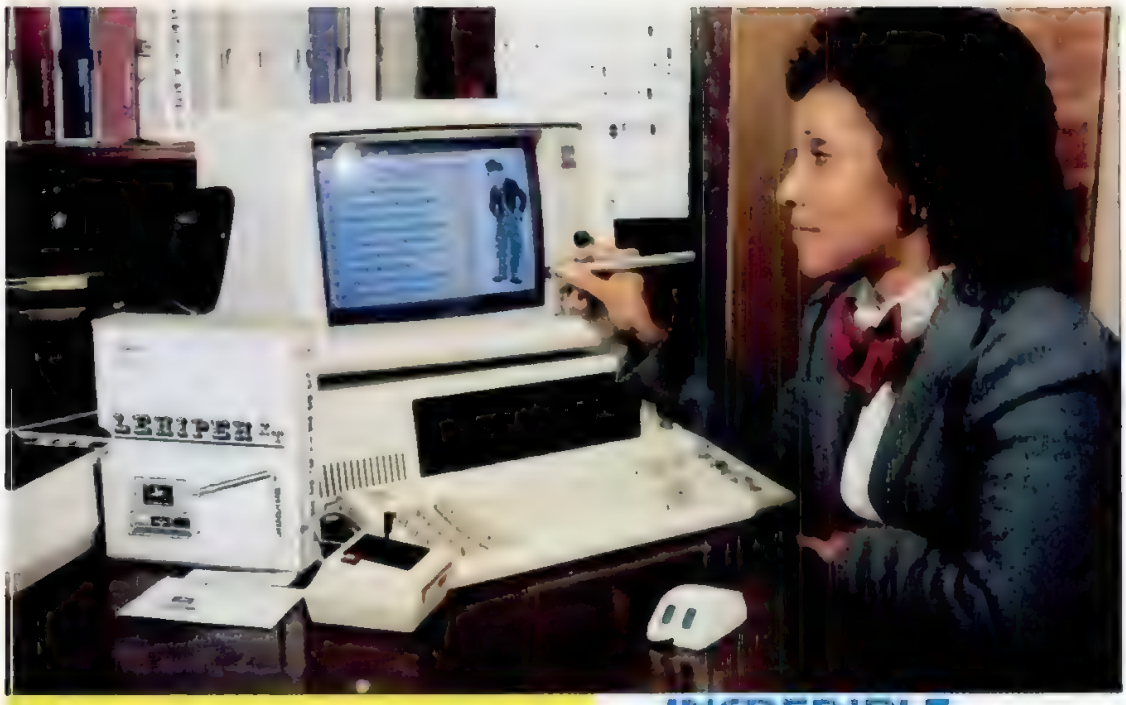
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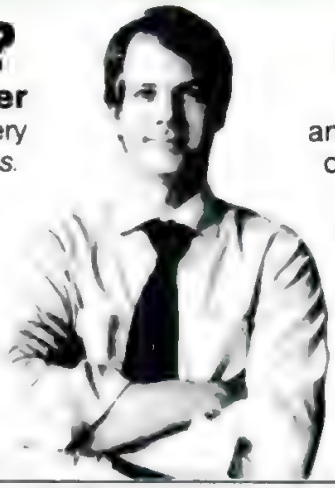
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Monochrome

And, for price/performance in a monochrome monitor, we're introducing the MAX-12: our new amber monitor that's as easy on the eyes as it is on your budget.

The monitor to meet your needs

All three PGS monitors are engineered for no-compromise performance to provide you with a cleaner, sharper image than any other monitor in the same price class. The HX-12 and the SR-12 both feature uncompromising color convergence for crisp whites without color bleed. The MAX-12 offers impressive clarity in a monochrome monitor with easy-on-the-eyes amber phosphor.

And all three monitors come with a non-glare screen and a shielded cable that plugs directly into the IBM PC or XT.

The HX-12 has the highest resolution (690x240) and the finest dot pitch (.31mm) in its class. And yet its suggested retail price is comparable to many medium resolution monitors. The HX-12 brings no-compromise color to the PC and now, with the PGS RGB-80 board, to the Apple IIe as well. **Suggested retail price: $695.**

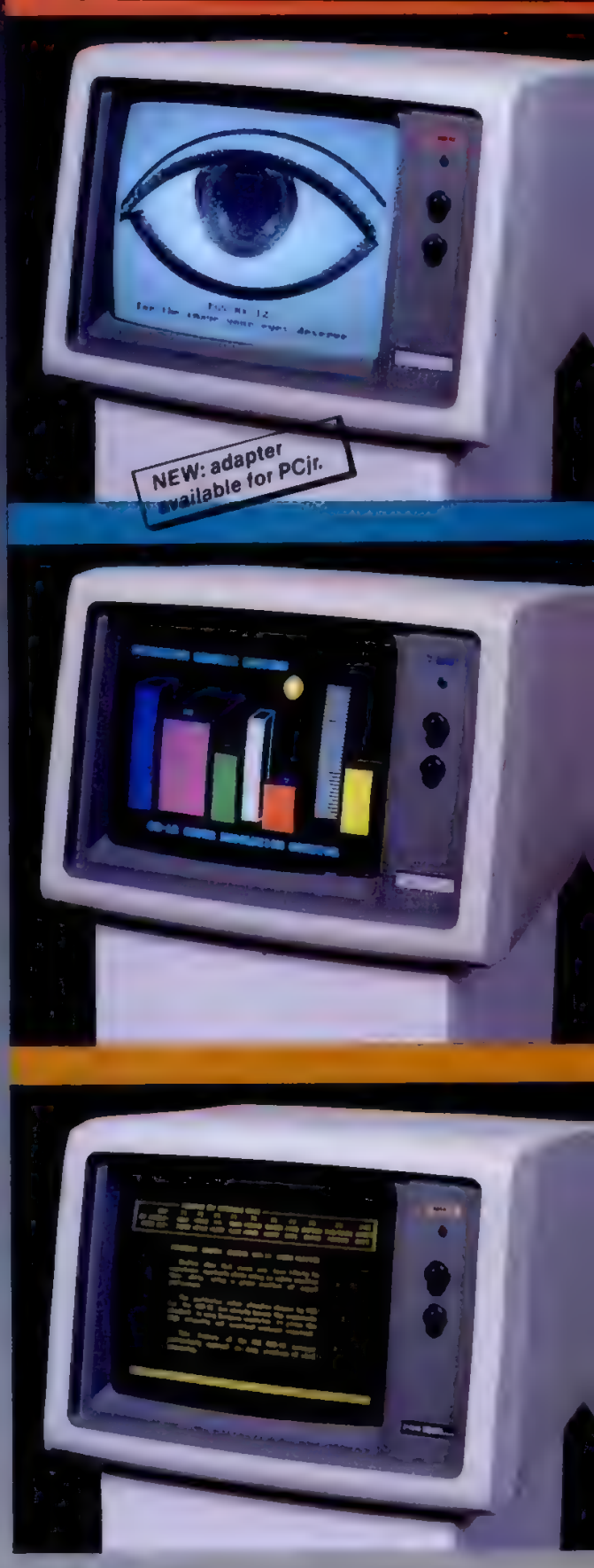
The new SR-12, in conjunction with the PGS high performance color graphics card, also features a .31mm dot pitch supporting 690 horizontal resolution. However, by increasing the horizontal scan rate to 27.5 KHz, the SR-12 can support 400 vertical resolution in non-interlaced mode. This results in a very high quality, flickerless image with the ability to generate graphics and text that is truly of monochrome quality. **Suggested retail price: $799.**

The new MAX-12 offers you easy-on-the-eyes amber with 720x350 resolution at a suggested retail price ($249) that is actually lower than the leading green-on-black competitor. And the MAX-12 runs off the IBM PC monochrome card—no special card is required.

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Whatever your needs, from word processing to super resolution graphics, there's now a no-compromise PGS monitor that sets the standard. Ask your dealer for a demonstration and let your eyes decide. Or call for more information and the name of your nearest dealer.

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On-Line Legal Fees

On-line libraries for legal research are costly, even if you master the techniques of their use. This second of a two-part series analyzes research strategies and details the fees.

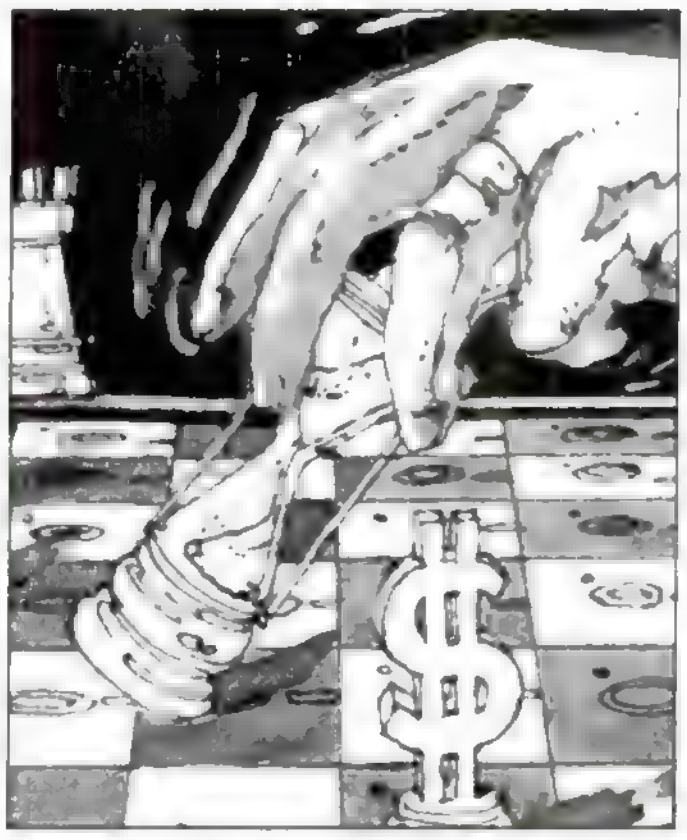
Researching on-line databases is a little like playing chess. By learning the names and basic moves of each piece, you can start playing fairly quickly. But mastering the preliminaries doesn't make you a master of the game. The skilled researcher, like the skilled chess player, must have a goal and a strategy for reaching it.

Reaching it isn't free in either case—professional-level chess or the profession of law. Prize money, in the one instance, and research fees and the outcome of a case, in the other, hang in the balance.

In on-line legal research, if you have a specific goal, that is, a precise item of information, such as the name of an author, the title of a book, the volume, reporter and page citation of a case, or a citation to a statute or regulation, finding the full text in Lexis or Westlaw is a piece of cake.

If, on the other hand, you are let loose in a full-text database with no goal or strategy for researching a broad subject, you can be overwhelmed with information; like the sorcerer's apprentice in *Fantasia*, you can unleash a flood of hundreds of cases. Alternatively, your request can be so detailed that the system turns mute and shows no case at all fitting your specifications.

The mark of the expert researcher lies in the ability to choose the right combination of words as the parameters of the



search. The verbal "gateway" into the database should lead straight to the authorities closest to the point being researched, bypassing what's extraneous and leaving a manageable amount of material. Defining the parameters of an efficient search, like mastering chess strategy, is a skill that requires cultivation.

It also requires a well-designed database that assists, rather than obstructs, the researcher. Both Lexis and Westlaw help narrow down information by assigning federal cases, statutes, and administrative materials into specialized libraries for antitrust, bankruptcy, communications, energy, government contracts, labor, patents, securities, and tax. Each library contains a number of files—say, a file for Supreme Court cases, another for circuit court cases, and a third for district court cases. The Lexis securities library also has a file for the Securities Acts, another for related regulations, and a separate file for the no-action letters. Each file can be searched separately. Each case or no-action letter is a separate document within a file.

Learning to Question

The technique of formulating the right question is important enough that Lexis, Westlaw, Dialog, and Prentice-Hall all have training programs lasting from half a day to two days to help researchers hone their skills. Basic instruction is also available in courses offered in cities throughout the country. It costs between $70 and $135 for from 3 to 12 hours of instruction.

Even with instruction, it's not easy to find exactly what you want in the database. But most lawyers concede it is much faster and covers far more ground than paging through the indexes of printed books. For materials only recently made available that are not well indexed, such as IRS private rulings, the consensus of specialists is that an electronic search is the only dependable source, short of memorizing advance sheets as they come out.

Will databases ever take the place of printed materials and libraries? Not just yet, it seems. To file away with other clippings, to carry off to a meeting, or to write

Illustration: Michael Ng



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down marginalia, nothing beats a piece of paper.

True, if you have only a general idea of what you are looking for and you need to skim a substantial amount of material, the tachistoscopic effect of a computer's display, like the speed reading training machines of yesteryear, can do wonders for you. In addition, the computer is superb as a tool for locating a specific needle in an informational haystack. Once you have located an item, however, the screen is distracting for those of us who grew up on books and newspapers. Maybe the next generation will overcome this prejudice.

An office should be prepared to spend at least $3,000 to $6,000 a year before signing up for either Lexis or Westlaw.

How efficiently and elegantly you formulate your search determines not only whether you find what you're looking for but also how much it costs you to look. For the individual lawyer, even an efficient search is expensive because Lexis and Westlaw are designed and priced with the large law office in mind. Normally, no single lawyer will use the on-line facility enough to justify the expense, but a group can provide the critical mass that does.

The new Lexis fee schedule consists of three parts: a minimum annual subscription fee of $1,320, add-on fees for additional professionals in the firm; an hourly connection time fee of about $28, payable $20 to Lexis and $8 to your local telecommunication facility (down from the previous $90); a fee for each search, ranging from $9 to $18, depending on the size of the file; and $3 for each modification or refinement of the search. Heaven help you if you misspell Smythe as Smith and have to restart the search. The lower rate for connection time, according to Lexis, is designed to let you read the cases "and validate your search while you are still on line." For night owls, the search fees are cut in half after 7:30 p.m. In addition, using an IBM PC as a terminal entails a one-time charge of $225 for the necessary software.

Westlaw uses a simpler, two-part formula consisting of a minimum annual subscription fee of $1,200 for the first terminal, increments for additional terminals, and hourly usage fees starting at $115 (with a 3-hour or $345-a-month minimum). Usage fees drop in stages to $65 when you are using over 100 hours a month, which is equivalent to an annual minimum of $5,340. As an alternative, Westlaw offers the small user a flat $1,800 annual subscription fee combined with an hourly charge of $150 regardless of the number of hours used.

As a practical matter, an office should be prepared to spend at least $3,000 to $6,000 a year before signing up for either Lexis or Westlaw.

By contrast, Dialog has no annual subscription fee, which means that with a modem and PC, anyone can play just by sending in an application for a password. The hourly rates range from $55 to $300 for its legal databases, with most running $90 to $120 an hour.

The Bureau of National Affairs has a subscription fee for its newer tax and securities databases keyed to its hard-copy services. The cheapest weighs in at an annual cost of $250 and only a $28 per hour connection time fee. BNA's older databases on patents and labor law are available through Dialog at $120 an hour.

Printing the Results

All services let you print out the results of your search while the meter ticks. It's the demand to download and print out off-line that causes controversy in the on-line data industry. Lexis does not offer this option except for those who rent its own dedicated off-line standalone printer. For

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$350, Westlaw offers software that permits you to store one screenfull at a time to disk and print out the text after you have gone off-line.

If doing your own printing strikes you as either inconvenient or too expensive, most electronic libraries will print whatever you request and mail it to you via an overnight service.

Some local bar association libraries and law schools will arrange access for lawyers on a fee-for-use basis.

If you're not part of a large law firm and you balk at paying the access fees, there are alternative ways to tap the electronic databases. Many law school students have access to Lexis because Mead Data installed its terminals in law schools across the country to build familiarity and loyalty in its prospective customers. Some local bar association libraries and law schools will arrange access for practicing lawyers on a fee-for-use basis. If this approach is not convenient, you can dial American International Data Search, Inc., toll free, at (800) 223–2437. An AID/Search lawyer-researcher will consult with you on the phone and help you formulate search parameters that AID/Search will apply in a personalized investigation, whose results will be mailed to you. Its charges are on a search-by-search basis, with the average report costing under $150.

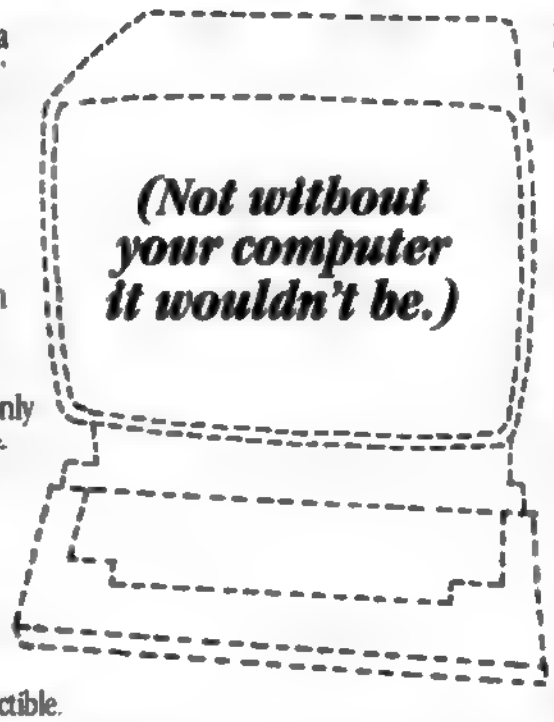
If it sounds like you need a PC to figure out the best strategy for electronic research, don't hold back. Assess the time you spend doing research and what it's worth, compare your findings to the costs and savings of using a database, and make your move. Winning strategies in the law like winning strategies in chess often depend on a bold move forward. ■

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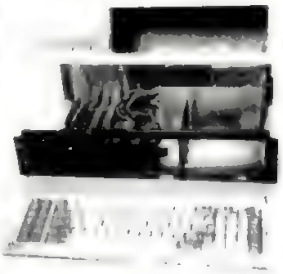
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Billing Programs
What to Look For

A doctor who runs his Ithaca, New York, office with a PC takes you through the process of setting up a computerized ledger and preparing bills for your patients automatically.



The most popular use for the PC in the medical office is billing. The first piece of software you'll probably want to buy, therefore, is a program to handle that task. In the last issue I talked about the essential hardware you need to automate a medical office with a PC. Even before you have that system in place, though, you should begin to think about the software you'll need.

In theory, you should be able to enter all of a patient's biographical information once and then recall it with a simple series of keystrokes each time you need it to write a bill. A hard copy of the bill should go to the patient and an electronic note made in your accounts receivable under that patient's ledger. If a patient makes a payment, it's nice to be able to enter it at the same sitting, updating the patient's ledger and providing a hard copy receipt immediately.

On the surface this seems to be a simple transaction, and writing a program to deal with it shouldn't be too difficult. With some basic programming skills you ought to be able to do it easily yourself in a few hours, even if you're only a novice. But like most other programming, it's accounting for the thousand and one variations of the theme that makes it worthwhile to buy from someone else. When you do buy, there are some important things to look for.

Let's start with the initial entry of biographical information. You usually need to know the full name, date of birth, home address, home phone, and perhaps business phone and address of the patient. Most people are covered by insurance, usually paid for by their employer or a governmental agency. You'll need to know the name of the insurance plan, its identifying numbers specific to your patient, and probably your patient's social security number. Many people have more than one insurance plan, so you ought to look for a program with space for at least two and perhaps three different plans in the biographical file.

If the patient is insured through a spouse's or parent's policy, the amount of information you need space for increases to include that of the insured as well. The dates on which you first and last saw the patient are also usually required by third parties, so it's a good idea to note these items here.

Beyond the basics, specialists will often have needs of their own. For example, an orthopedic surgeon who sees a lot of accident work or worker's compensation cases might want to include dates of disability, nature of injury, and specifics of the accident. An internist would probably find information of that nature wasteful of time and storage space.

You might also like to include a diagnosis (perhaps two or three) if it's unlikely to change, and space for several medications could be valuable. An account num-

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CIRCLE 163 ON READER SERVICE CARD

ber might be useful, but it should really only be used for reference within the machine.

Some systems allow you to bill by family, others only by individual. Decide which will work for you. A pediatrician who sees several kids in one family but sends the bill to Dad might like the former.

An internist who sees older patients would need separate records for each family member to keep Medicare numbers straight.

An internist who sees older patients would need separate records for each family member to keep Medicare numbers straight.

Ledger Domain

Before you begin keeping ledgers, you have to decide what form they should take. You have two major choices: balance forward and open item.

A balance forward system remembers how much the patient owes but not for what. It may or may not remember whether the amount due is from an insurance company or the patient. It usually will be able to tell if a payment is overdue and by how long. This type of accounting program doesn't take up too much storage space, is not too complex, and is relatively inexpensive. It may fit your needs, although I find it inadequate for mine.

An open item system keeps track of each charge until you erase it. You therefore keep an itemized account for each patient you see and can provide those details to third party payers—who will almost always ask for them. When you receive a payment you should be able to attribute it to a specific previous charge, though many programs that use this type of accounting don't provide for that. If a partial payment is posted to a service, you should also be able to tell who has paid and who owes the remainder, a third party or the patient.

Each transaction that you'll enter in your ledger consists of several components: a date of service, type of service, place of service, description of service, procedure code, unit of service (don't you sometimes perform more than one EKG on one patient in one day?), usual fee, and total charge. Each of these items has its own niche to fill on an insurance form. Entering each one by itself is a tedious process; the program you buy should allow you to establish a library of at least 100 of these procedures. You can then enter an appropriate date and issue a keyword to call the proper series of entries. At the time of entry, you should be able to, if necessary, change any of the information automatically entered.

The procedure library you create should contain the above items for each procedure you perform. You should be able to specify at least three separate codes for each procedure to make at least three third party payers happy, and the machine should scan the patient's biographical information to print the appropriate codes for that patient's insurer.

The best programs allow you to define your own short (and perhaps mnemonic) alphanumeric phrase to name each entry. Many programs allow only numeric codes, which are difficult to remember and thus may not be valuable to you.

Billing Time

When you're ready to write a bill, you should be able to call a patient's file up using only that patient's name. The machine should display the name and some other identifiers such as an address and phone number, which should let you confirm that this is indeed the patient you wish to bill. Alternately, you should be able to scroll up or down an alphabetical list of names.

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The program should know what type of insurance the patient has and display the appropriate codes for that carrier. You should be able to enter the number of units and alter any item, including the default fee if you wish. You should then be able to continue entering until you have completed the bill.

When you have entered the final transaction, the program should ask you to confirm the screen and give you the opportunity to make any changes. If the patient has Medicare or Blue Shield coverage, you should be asked if you want to accept assignment on this claim. If you respond "yes," the program should display the appropriate discounts and update both your accounts receivable and the patient's ledger.

At this point you should be able to enter any payments made at this time, specifying source, payment type (check, cash, credit card) and an identifying number. You should be able to attribute this payment to a specific transaction in the patient's account, and the account should be updated to reflect payments made and outstanding balances. It would be nice if the system could specify the party from whom payment is expected on all partially cleared transactions although not essential.

The program should give you the opportunity to print a bill immediately for both the patient and his insurance company—here you may find multiple printers useful if not essential.

That is the essence of computerized office billing. But office management software goes further. In upcoming columns I'll cover the various libraries of information that are generated in day-to-day office practice and explore the advantages of the many reports based on the practice data collected. ■



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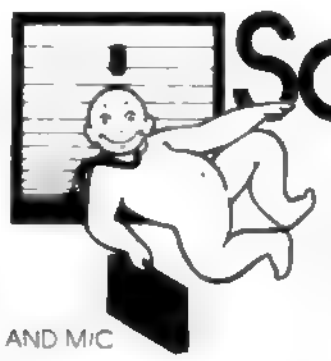
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Clashing Policies on In-Flight Computing

With no FAA regulations or conclusive evidence concerning the safety of personal computer use in flight, passenger airlines now find themselves in a state of policy-making anarchy.

If you have recently tried to use a personal computer on board your favorite airline, you may have unwittingly tapped into a source of major controversy. Many passenger carriers are prohibiting the in-flight use of personal computers and electronic games, because they are fearful of hazards that these radio frequency-emitting devices may cause.

Federal regulations dealing with portable electronic devices are admittedly obsolete. Some are underinclusive; they mention things like hearing aids and pacemakers but do not account for more recent technological advances. Others are overinclusive, giving pilots discretion to forbid any device that might cause interference with the navigation or communications systems.

The Federal Aviation Administration, in the absence of evidence concerning RF interference from personal computers, has let the carriers determine their own guidelines. The resulting vacuum has forced individual airlines to make their own decisions, and at this point they are still both cautious and confused. Until late last year there was a fairly uniform ban on using any electronic instruments while in flight. However, as the airlines began testing the effects of these devices on airplane instrumentation, they gradually, if tentatively, started allowing their usage.

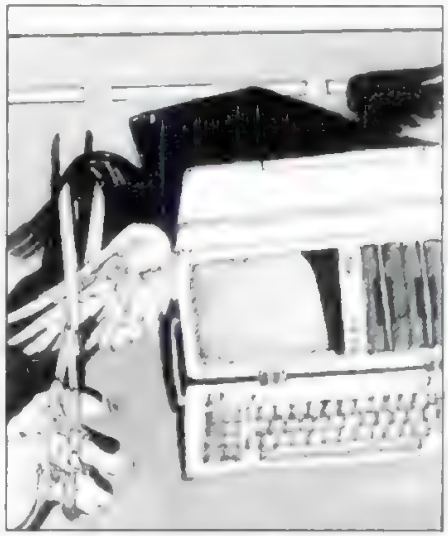


Illustration: Michael Ng

Passengers interested in using a computer in flight today can encounter a full spectrum of responses. SAS says, "No problem." El-Al says, "No way." Eastern, supposedly the first to restrict the use of micros and computer games, has now consented to the use of personal computers during flight, but not during takeoff or landing. United changed its policy on January 18 of this year with a written amendment to its rules: "Self-powered typewriter-style portable computers and accessory printers and tape devices may be used by passengers in-flight."

Some carriers are just as specific in their sanctions against computers. American Airlines will allow the use of palm-sized electronic devices, but lists personal computers among the items that may not be operated on board. A Delta representative was simple and succinct: "Anything electronic cannot be operated on a plane." The possibility of airwave interference was Delta's justification.

Most airlines are more ambiguous in their policies and open-minded in their attitudes. Pan American works on a case-by-case basis. Passengers may bring their computers to the airport early for a flight so the machines can be subjected to medium-range interference tests on the plane. Pan Am also warns that interference can be reciprocal—the aircraft's powerful electronic equipment might demagnetize or otherwise damage a passenger's software.

New York Air was responsive, but confused. My first phone call prompted a vehement "No!" from a representative who cited interference with messages between cockpit and tower and alleged FAA regulations. When I called back, I received a vigorous "Yes," because personal computers "don't transmit any radio waves to the ground."

When I asked Iberia representatives whether the in-flight use of personal computers was allowed, they were indignant in their denial. When I told them that I was booked on one of their flights and my patronage depended on this permission, they quickly changed their tune.

Why Not?

Explanations given for not allowing personal computer operation on board included such reasons as magnetic fields that may throw off radar systems, interference with automatic pilots, and leaking batteries. These answers were more specific and scientific than others. An Alitalia spokesman said, "They can't be used . . . because . . . it has something to do with . . . they can't be used."

Different airlines interpret the lack of authoritative findings concerning RF interference from personal computers in different ways. Japan Air Lines melodramatically invoked the spirit of Korean Airlines Flight 007, downed by Soviet Fliers because it strayed slightly from its narrow course. "We have no intention of wavering in a similar situation," a JAL spokesman said, adding that the airline will not take a chance as long as interference is a possibility. On the other hand, Air France considers the in-flight computer use safe because it has not received any information to the contrary.

Federal agencies and industry groups have been just as noncommittal in their declarations on the matter. The Air Transport Association, a D.C.-based trade organization for the airlines, stresses the uniqueness of each aircraft. "No two airlines have the same electronic configuration of navigations and communications," said ATA spokesman Tom Tripp. He legitimized airlines' fears by confirming that a plane's instrumentation is sensitive to low-power transmitters, like personal computers.

Part 15 of the Federal Communications Commission's rules establishes specific guidelines with respect to radiated and conducted radio energy from computers, peripherals, and electronic games. As emended in 1979, these rules impose emission limitations designed to minimize RF-interference potential. Still, the spurious levels condoned by the FCC are not necessarily low enough to preclude interference with airplane avionics.

In Progress

The burden of conclusive research has fallen to the Radio Technical Commission for Aeronautics (RTCA). In 1963, this federal advisory committee produced RTCA Docket 160A, which set limits on RF emissions and is still the last word on the matter. Now the commission is investigating the field again through Special Committee 156.

SC-156 is composed of representatives from the airlines, airframe manufacturers,

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computer firms (IBM is not among them), trade associations, and federal agencies. It is open to the public. Its findings will, as committee member Andres A. Fraga hopes, "generate standards that would implement a consistent method of approving use of passenger-operated electronic devices aboard air carrier aircraft."

Since its inception late last year, SC-156 has met twice. Among the significant developments are the following:

- NASA's Aviation Safety Reporting System concluded that 40 out of its database of 30,000 safety-related incidents involved electronic interference. The only one relevant to the committee's focus involved not the use but the storage of electronic devices on an Eastern DC-9.
- Eastern Airlines tested portable computers and electronic games and found that only within 50 feet of the aircraft antennas did substantial interference result. Even then, an increase in voltage was all that was required to override the interference. The report ended with the most important finding: "There were no cases of interference during the flight tests."
- Delta modified a personal computer to make it a "worst-case" type of device and found no interference with communications and navigations receivers or engine warning lights.
- Tandy Corporation commissioned a test to determine whether its TRS-80 Model 100 Portable Computer exceeded the radiated emissions limits laid down in RTCA Docket 160A. On a battery-driven basis, the Model 100 met both the narrowband and broadband standards.
- Hewlett-Packard tested portable computer products against RTCA Docket 160A, and found that some portable computers and even calculators failed to meet the levels established therein.
- Tandy, Apple, and Hewlett-Packard agreed that peripherals (disk drives, printers, displays) and unshielded cables could be the worst RF emitters.

These interim conclusions added up to a favorable report for in-flight use of personal computers, but also proved that airlines' fears are not entirely unfounded.

The RTCA findings are only recommendations, but they may be used by any federal agency in a regulatory manner. So until all the facts are in, the airlines will remain on their own, and anyone wishing to operate a micro while in flight had better find out beforehand what the bottom line is on that day for that airline. ■

Jeffrey Lener is a free-lance writer based in New York.

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Symbolic Logic

With a postprocessing program, you can prepare your word processor and graphics printer to produce any set of specialized symbols you need, from π to ©.



Boot up your favorite word processor on your PC, and once it's in its editing mode, try this: Hold the Alt key down and using the right hand numeric keypad, enter 227. Then release the Alt key and type an *R*. Holding down the Alt key, enter the digits 253 on the right hand keypad again and release the Alt key. What you will see is the formula for the area of a circle with radius R:

$$\pi R^2$$

Although the PC can form an amazing variety of special symbols on its screen, few products are available to get these images onto paper. Most word processors cannot send a string of bytes to the printer to make it form an unusual character like π. And most printers cannot redefine their characters using downloaded, printer-resident instructions.

With the proper program, however, any graphics printer can mimic any screen symbol (or even a nonscreen symbol) from a word processor's output. A program of this kind is called a postprocessor—that is, a program that is used after the word processor. It modifies textual information after that information has moved from keyboard to disk, but before it arrives at the printer.

Any word processing system has a printer interface that sends each byte to the printer in an appropriate form: an ASCII code for alphanumeric data with the control codes for correct line spacing, tab settings, font, density, and so forth.

The postprocessor interprets these codes to create the special symbols and characters. Each byte of printer code directs the postprocessor program to construct the needed printer instruction sequence. In this way, the printer can have a complicated "smart" response to any special character appearing in the text.

The Screen Symbols

Appendix G of the IBM PC BASIC manual lists the symbols available in the display screen's character generator ROM. This variety of special purpose symbols is extremely useful for word processing applications in finance, language, engineering, and science.

The postprocessing program that I will describe in my next column will allow you to print these symbols in text, as long as you are using a printer that can be programmed to print the desired character using a string of graphics bytes—many dot matrix printers can do this. The program permits you to connect the displayed symbols on the PC screen with the symbols printed in the finished text. (See Figure 1 for an example.)

You could put this program to four other uses. First, it permits you to map any character onto any other. Second, it allows

Illustration: Philip Anderson



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you to convert any single-byte control code generated by the word processor or text formatter into the code or string of codes needed by the printer. Thus the postprocessor can supplant the printer-control table portion of a word processor. Third, you can implement custom modifications of conventional characters without much difficulty. For example, if the appearance of your dot matrix printer's "1" conforms to the American standard (that is, it has a serif on the bottom), and you want a more European shaped 1 (with a larger hook but no serif), you could benefit from a printer remapping program such as this one. A printer remapper or character postprocessor also allows you to create completely new characters (ones that do not appear in the IBM screen character set or are not available in the printer's repertoire of symbols) that can be useful in special applications: the copyright symbol, ©, the small superscript trademark identifier, or the round black bullets used to highlight items in an outline or viewgraph. Or you could arrange to print a corporate logo with a single keystroke.

Information Flow

How does a character postprocessor work? It instructs a word processor to print to disk, instead of sending its finished text directly to the printer. This finished text includes such touches as page numbers, margin control, double- or triple-spacing if requested, and headers or footers. (Nearly all word processors are capable of operating in this indirect mode.)

The character postprocessor then reads this disk print file to prepare its substitution or translation file. Essentially, it reads the first character in the text file, looks up the string of characters in its translation table, and sends that string to the translated print file. Then it loops back to get another character. For most characters, of course, the translation involves no change at all; the new character code is identical to the original. Thus, for example , it translates an *A* (code number 65) into an *A*. But for some of the characters, namely those listed in a preparatory font table, the translation replaces the single byte from the word processor with a string of one or more bytes. This translation table allows a simple program to produce a complicated graphics print instruction on demand.

In my next column I shall list the postprocessor program and explain how to build your own font table and to operate the program. ■

Michael Lampton is a physicist at the University of California—Berkeley's Space Sciences Laboratory and an astronaut-in-training for NASA. He uses a PC for scientific calculations and word processing.

$$P(v) = \int_{r=0}^{v\delta t} \int_{\theta=0}^{\pi/2} \int_{\phi=0}^{2\pi} 2\,d\rho$$

$$= \mu n dA\ f(v)\ v^2\,dv\ \delta t/3$$

Now the total momentum transferred is found by integrating over all speeds

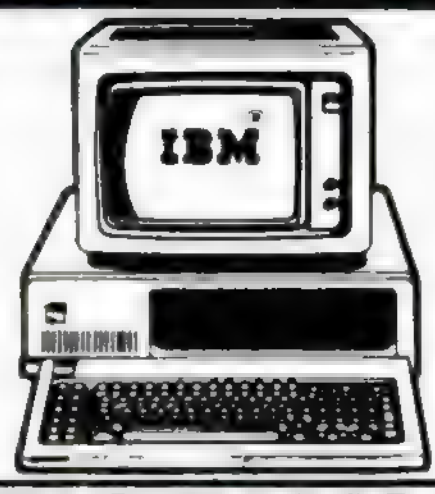
$$\Delta p = \int_0^{\infty} n dA \delta t\ f(v)\ v^2\ dv/3$$

$$= (2/3) n dA \delta t \int_0^{\infty} (1/2\mu v^2)\ f(v)\,dv$$

$$= (2/3) n\ dA\ \delta t\ \langle E \rangle = nkT\ dA\ \delta t.$$

Figure 1: *A sample of text prepared with a Greek and mathematics postprocessing program, courtesy of J.R. Burke and S.M. Lea.*

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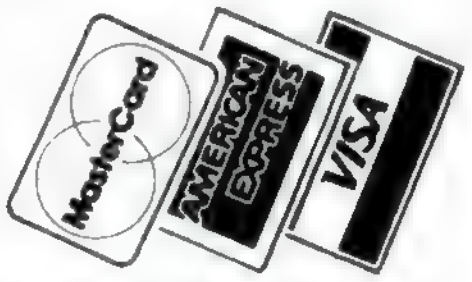
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Applications for the Smart Clock include security access control, equipment operation, payroll, and manufacturing process control. To use, an individual inserts a badge, punch card, or similar identification method into the device. When no other data are required, the card is then ejected, completing the transaction.

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***Desk Top Information Display System**, Sammanish Data Systems*

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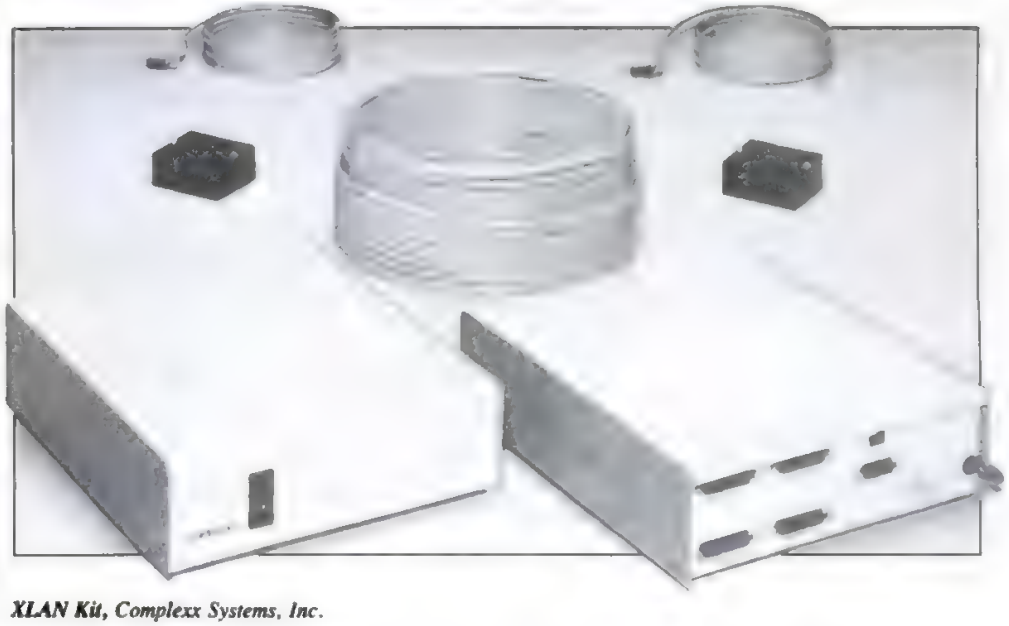
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The StationMaster devices also feature an integral modem with autodial/answer



***XLAN Kit**, Complexx Systems, Inc.*

capabilities, permitting communications over phone lines to any device in the LAN. Built-in software includes a proprietary operating system, with menu-driven access to setting up the StationMaster's operating parameters, making calls, and monitoring network activity.

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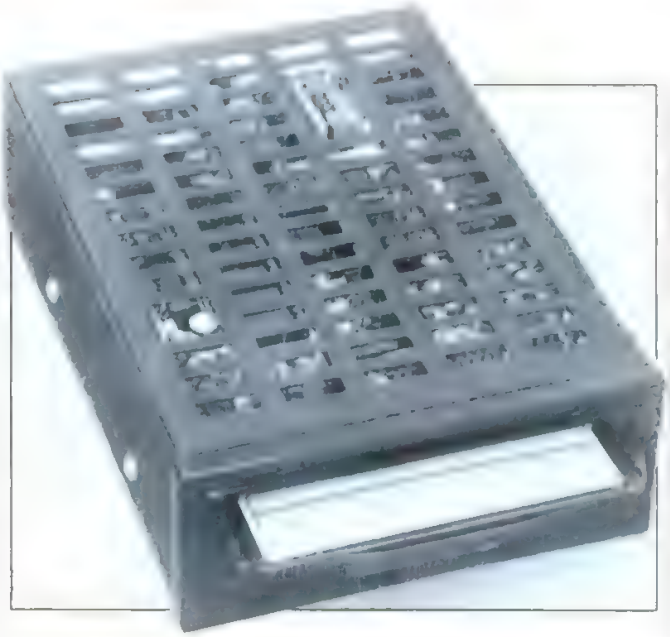
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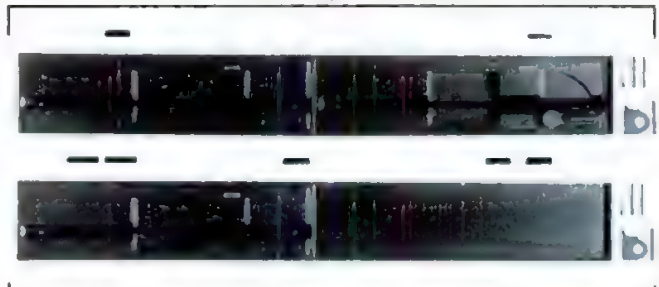
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(516) 423-3232

CIRCLE 750 ON READER SERVICE CARD

FD-PC8

An 8-inch, double-sided disk drive providing up to 2.5 megabytes of on-line storage capacity. Half the height of standard 8-inch drives, the FD-PC8 can be stacked on top of, under, or next to the user's system. Constructed from Shugart drives and incorporating a stepper motor that runs only when actually selected by the user, the FD-PC8 is available in both single and dual system configuration.
(List Price: Single Drive $1,095; Dual Drive $1,495)
Floppy Disk Services, Inc.
741 Alexander Rd.
Princeton, NJ 08540
(800) 233-0306
(609) 799-4440

CIRCLE 744 ON READER SERVICE CARD



FD-PC8, Floppy Disk Services, Inc.

Internal Hard Disk

A half-height Winchester drive offering 12.76 megabyte storage capacity in a unit designed to fit within the systems unit of the IBM PC, utilizing the existing power supply to emulate an IBM PC-XT. The easily installed hard disk upgrading kit consists of the Winchester, a controller card, and software for supporting the drive under PC-DOS 2.0

(List Price: $2,195)

Mountain Computers, Inc.
300 El Pueblo Rd.
Scotts Valley, CA 95066
(408) 438-6650

CIRCLE 758 ON READER SERVICE CARD

Color IV Monitor

A high-resolution color monitor available with either RGB analog or digital input interfaces. The monitor can accurately display the 16 colors presented by the IBM Color/Graphics Adaptor, producing a resolution of 720 × 420 addressable dots. The unit is capable of a 96 × 24 character display. The design of the Color IV utilizes a deflection yoke with transformerless power supply to assure minimal distortion.

(List Price: $995)

Amdek Corp.
2201 Lively Blvd.
Elk Grove Village, IL 60007
(312) 364-1180
Telex: 25 4786

CIRCLE 757 ON READER SERVICE CARD

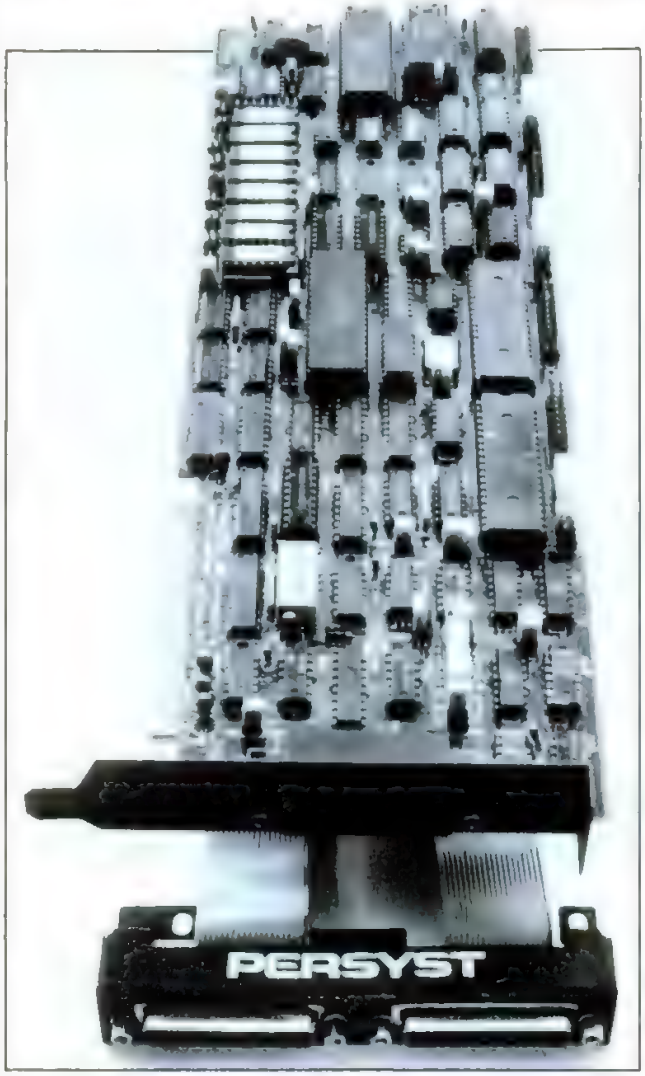
Coax/3278

A plug-in communications board providing the user with a high speed coaxial port. The port allows a PC to be linked locally to an IBM 3274 or 3276 cluster controller in either SNA or Bisync distributed processing networks. The board's interface permits the IBM PC to function as a local IBM 3278 terminal, while retaining its ability to process data independently.

(List Price: $995)

Personal Systems Technology, Inc.
15801 Rockfield Blvd., Ste. A
Irvine, CA 92714
(714) 859-8871

CIRCLE 754 ON READER SERVICE CARD



Coax/3278, Personal Systems Technology, Inc.

Era 2

A 1200-baud board modem with supporting software. Era 2 incorporates the Microcom Networking protocol, providing communications compatibility with other products and services that already support the protocol. It is Bell 212A or 103 compatible, FCC certified, and can accommodate full duplex or half duplex transmissions up to 1200 baud. Era 2 provides auto-answer, originate-answer, and pulse or tone dialing.

The system comes complete with menu-driven communications software. The user can define a series of interactions with a remote system and implement them in one keystroke. The software provides on-line printer control and maintains up to 33 digits per stored telephone number. Users can send and receive complete files, and set communications parameters such as baud rate, flow control, character format, parity, tabsetting, answer-back, and screen background.

File maintainance capabilities include a directory of files, and the ability to display, print, delete, and rename files.

(List Price: $499)

Microcom, Inc.
1400A Providence Hwy.
Norwood, MA 02062
(617) 762-9310

CIRCLE 745 ON READER SERVICE CARD

SOFTWARE



Magic/MPS, Data Management Associates, Inc.

Magic/MPS

A medium-level language that permits programming without a run-time package. *Magic/MPS* has file I/O capabilities for random, sequential, and ISAM file types. The Magic Compiler permits the instruction set to create and maintain machine-executable programs.

Features of the language include variable internal data areas with buffers; BCD arithmetic with up to 36 digits; simplified screen formatting and data editing; ability to mix the handwritten assembly language anywhere in the source code; total string manipulation capability; and control over peripherals and conditional compilation of source code.
(List Price: $995)
Requires: 128K RAM, one disk drive, PC-DOS.
Data Management Associates, Inc.
Box 4340
Wilmington, DE 19807
(302) 655-8986

CIRCLE 765 ON READER SERVICE CARD

1-RingyDingy

A general-purpose asynchronous communications program, capable of communicating at speeds up to 9600 baud. The software permits transfers of files, including non-textual (.EXE or .COM) files, with other systems supporting the XMODEM protocol. It can be used with either auto-dialing or non-auto-dialing modems, and permits the user to actively edit files to be sent over phone lines as the files are called up by the program.

Other features of *1-RingyDingy* include the ability to save and transfer session data to disk at the completion of the session; to set up "filters," eliminating unwanted characters from the incoming data; and to store complex log-on procedures for a variety of remote systems, including phone numbers, passwords, and access commands.
(List Price: $35)
Requires: 64K RAM (PC-DOS 1.1) or 96K (PC-DOS 2.0), one disk drive, serial communications port, modem.
J. Button
P.O. Box 5786
Bellevue, WA 98006
(206) 746-4296

CIRCLE 735 ON READER SERVICE CARD

microSHARE

A multi-user operating system replacement for PC-DOS. *microSHARE* allows up to three screens—the main video screen, plus those of two attached terminals—to run standard PC-DOS and CP/M-86 programs simultaneously. The operating system, designed for use with the IBM PC/XT, has a built-in print spooler for background printing at full printer speeds, and two levels of security provisions for protecting the user's data.

For programmers producing applications to run under MS-DOS or CP/M-86, *microSHARE* permits code assemblies and compiling to be performed as a background operation, while editing new code in the foreground.
(List Price: $499)
Requires: 640 RAM, one disk drive and hard disk, two serial ports, two dumb terminals, one parallel port, parallel printer.
Digitrol Computers Inc.
440 Phillip St.
Waterloo, Ontario
Canada, N2L 5R9
(519) 884-4541

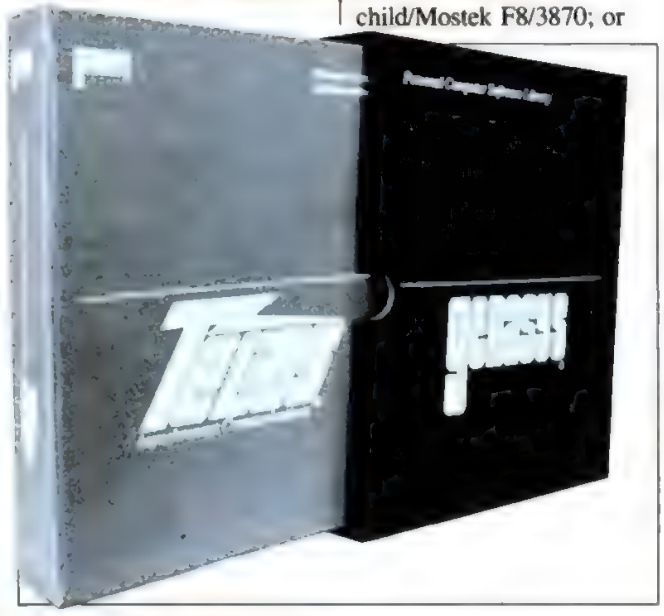
CIRCLE 739 ON READER SERVICE CARD

Telios Version 2.0

An asynchronous communications program that can operate at speeds from 110 to 9600 baud via a network or through modems hardwired to the user's system. Its internal buffering allows screen scrolling through 250 lines of data during the communications process.

The command-driven system enables the user to establish predefined sequences for logging on to various computers, capturing data to the PC, and sending data to the host computer with one keystroke. Other features include user-definable screen colors, screen mute, port switching commands, and both XMODEM and KERMIT file transfer protocols.
(List Price: $119.95)
Requires: 96K RAM, one disk drive, PC-DOS, asynchronous port, modem.
GENASYS Corp.
Microcomputer Products Group
11820 Parklawn Dr.
Rockville, MD 20852
(301) 770-4600

CIRCLE 763 ON READER SERVICE CARD



Telios Version 2.0, GENASYS Corp.

MACxx Cross-Assembler Series

A series of cross-assemblers that permit PC-DOS (MS-DOS) systems to produce assembly code for the following microprocessors: Motorola 6800/01/03/11, 6805, or 6809; Intel 8085, 8048, or 8051; the MOS Technology 6502; the Texas Instruments TMS7000, TMS32010, or 9900 series; the Zilog Z8; the National Semiconductor 8070 or COP400 series; the Fairchild/Mostek F8/3870; or the RCA 1802/4/5/6. The software features a macro-assembler, a cross-reference generator, a screen editor, a hex file converter, and off-loading facilities.

Assembler mnemonics adhere to the assembly languages defined by the IC chip manufacturers. The macro assemblers include full macro and conditional assembly features, as well as the ability to include a series of source files during a single assembly. Programs developed under the cross-assemblers must be downloaded to the target processor for testing.
(List Price: $150 each Cross-Assembler)
Requires: 128K RAM, one disk drive, PC-DOS.
Allen Ashley
395 Sierra Madre Villa
Pasadena, CA 91107
(213) 793-5748

CIRCLE 781 ON READER SERVICE CARD



***Budget Trac**, Duosoft Corp.*

Budget Trac

A budget analysis program providing immediate on-screen access and hard-copy reports of current expense data related to budgeted items. Written in Ryan-McFarland COBOL, the software concentrates on individual areas of responsibility within a budget, rather than on typical profit center breakdowns. Data is validated prior to acceptance as the user enters daily payments, encumbrances, and/or releases of prior-budgeted funds and budget funds to be transferred between accounts.

Budget Trac uses single-sided entry techniques, requiring less time than standard double-entry, general-ledger systems, both in establishing master files and in processing daily transactions. It offers flexibility in defining a chart of accounts, allowing the user to

Mom™ works best with CICS, TSO, & CMS.

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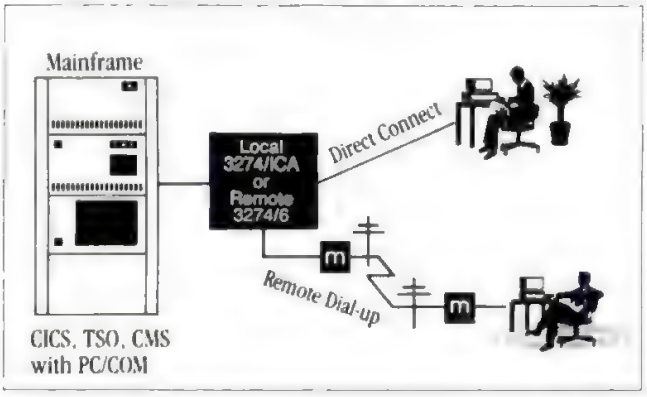
At last. MOM closes the gap between mainframe power and microcomputers. With an ingenious piece of software that works with the current IBM operating systems (CICS, TSO & CMS). It's called PC/COM and, quite frankly, it's a wonder of a micro-to-mainframe link.

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MOM's PC/COM is one of the fastest ways to transfer information. And talk about flexible. PC/COM works with either an emulator board or protocol converter, in either a direct connect or remote dial-up environment. Any way you look at it—or use it—MOM maximizes your capabilities and minimizes the amount of time that's required to handle information. Here's how PC/COM works in the scheme of things:



You'll be hard pressed to find anything work as fast or as friendly as PC/COM. Call **1-800-241-1170** to talk to MOM about the equipment you have and the capabilities you need. MOM knows how to make your CICS, TSO or CMS work like never before. And how to get increased performance out of your micros. Be sure to ask MOM about her special site-license agreement.

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CIRCLE 805 ON READER SERVICE CARD

To communicate voice the ordinary modem



and data simultaneously, leaves a lot to be desired.

Introducing the Tel-A-Modem.

Now you and your personal computer can talk on the same phone at the same time.

Let's say, for example, certain data you were transmitting via your personal computer to a remote computer user needed some verbal explanation to go along with it. With the ordinary modem it couldn't be done. Not simultaneously.

You'd have to first call the user to inform them that data was coming. Hang up. Redial in order to connect modems. Transmit the data. Hang up. And then call back with your explanation. If you had additional input to transmit and discuss, you'd have to begin the whole process again. Talk about frustration.

Code-A-Phone's solution to this problem is the Tel-A-Modem. An innovative two-line desk telephone integrated with an intelligent modem capable of transmitting voice and data simultaneously.

Of course, the genius of Tel-A-Modem doesn't end with its unique communication capabilities and state-of-the-art convenience.

Specially designed for use with RS-232C compatible computers and terminals, it offers a full spectrum of both telephone and modem cost effective features, including: single button selector for voice or data on either line; full-duplex mode; automatic answer/originate modes; 300 and 1200 baud data transmission rates; automatic selection of baud rates; switch dialing for tone-dial or pulse-dial systems; memory autodial; and modem status LEDs.

So much for words.

For more information and the name of your nearest Tel-A-Modem dealer, call 1-800-547-4683. That is, just as soon as your computer gets off the phone.

In Oregon, Alaska and Hawaii, call 1-503-655-8940.

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CIRCLE 155 ON READER SERVICE CARD

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refine the general structure into measureable units of interest.
(List Price: $495)
Requires: 64K RAM, one disk drive, PC-DOS.
Duosoft Corp.
1803 Woodfield Dr.
Savoy, IL 61874
(800) 221-7638
(800) 223-7638 in Illn.

CIRCLE 767 ON READER SERVICE CARD

Purchase Order

A module for the *INV-X* inventory control system or the *AP* accounts payable system available from the software's producers. *Purchase Order (PO)* can print purchase orders and update inventory files simultaneously, eliminating the need to tediously re-enter data to separate components.

The program can inform the user of cash requirements for orders planned, permitting the user to alter planned orders until the cash requirements meet budgeted amounts. *PO* will group all items under the same vendor and get the name and address information for vendors from files maintained by the *AP* module.
(List Price: $98; with complete accounting system, $498)



***Purchase Order*, Micro Architect Inc.**



***KEY II*, Lighthouse Software Corp.**

Requires: 128K RAM, two disk drives, PC-DOS.
Micro Architect Inc.
6 Great Plains Ave.
Burlington, MA 01803
(617) 273-5658

CIRCLE 761 ON READER SERVICE CARD

KEY II

An enhancement program for Lotus' *1-2-3* integrated software, providing extended macro key functions and simplified command procedures. *KEY II* lessens the need for user expertise in *1-2-3* data management commands, as it offers the user a series of menus from which to choose commands.

KEY II is loaded into *1-2-3* as a worksheet file and then takes control, providing keyboard macros that reside within the worksheet. With menu selections provided by the software, the user loads a database, then selects and executes the particular *KEY II* analysis desired.

The software consists of six routines that can work within worksheet data files with up to 30 fields and 1,800 records. One such routine, Distribute, can produce cross-tabulations of worksheet databases in almost any form desired. With the Distribute routine, the user can create more than 13,000 different tables from one set of data.
(List Price: $189)
Requires: 128K RAM, two disk drives, PC DOS, Lotus' *1-2-3*.

Lighthouse Software Corp.
P.O. Box 15
Hilton Head Is., SC 29938
(803) 785-4949

CIRCLE 769 ON READER SERVICE CARD

ACCESSORIES

Solid Walnut/Oak Furniture

A line of solid walnut or oak furniture available for printers and IBM PCs and XTs. The printer cabinet comes with storage space for printer paper, books, and other accessories. The dimensions of the "print center" are 24 × 20 × 23 inches. The stand for the portable computer, measuring 20 × 14 × 4 inches, tilts and swivels for user comfort.

In addition, two kinds of cabinets are available for the IBM PC or XT. The PC-RV is designed for transporting the entire computer system easily, with space to carry printer paper and other accessories. The command center holds the microcomputer, monitor, keyboard, external modem, power center, and accessories. A rolltop, which can be locked, covers the entire work area. The entire system is transportable. The PC-RV measures 22 × 24 × 33 inches. The Command Center is 32 × 24 × 34 inches.



Solid Walnut/Oak Furniture, Lifeline Information Systems, Inc.

(List Price: $179 to $699)
Lifeline Information Systems, Inc.
Box 766
Sandy, UT 84091
(801) 566-5340

CIRCLE 788 ON READER SERVICE CARD

Copy Cover

A combination keyboard dust cover/copy holder that clips on to a standard PC keyboard. The Copy Cover, made of clear, static-free Lucite, can accommodate paper up to 11 × 16 inches in size. It positions copy directly above the keyboard, below the monitor.

(List Price: $39.95)
C-Thru Products
6351 Lk. Worth Rd.
Lk. Worth, FL 33463

CIRCLE 787 ON READER SERVICE CARD

Daisy Desk

A solid oak desk with specific areas designed for the computer, the monitor, the modems, floppy disks, printer, silent paper feed, and so forth. The overall desk size is 52 × 32 × 52 inches, and the printer space is 24 × 18 × 22 inches. The desk has a built-in bookshelf light and an adjustable shelf and glare-reducing hood for the CRT.

Additional features of the unit are a swing-out door for easy access to diskettes, door locks, and cooling fans for computer and printer areas. The desk is available in light, medium, and dark natural wood finishes.

(List Price: $990)
Daisy-Net International, Inc.
P.O. Box 1152
Northbrook, IL 60062
(312) 724-3800

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First Touch

An antistatic pad that, when grounded, protects computer equipment from static-induced damage or degradation by draining charges to ground rapidly. The ⅛-inch-thick pad covers an area of 24 × 26 inches and can be trimmed to fit smaller work areas. It is made up of a semiconductive vinyl overlay and a highly conductive inner layer, adhered to a nonskid, noise-reducing foam backing. The pad resists alcohol, water, coffee, and food spills, and can be cleaned with household soap and warm water.

(List Price: $69.95)
3M Corp.
P.O. Box 33600
St. Paul, MN 55133
(612) 733-9572

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Data Transfer Switches

A line of serial and parallel switches requiring no special power provisions. Switches are available in the following standard configurations:

- Model TS2-1, ABC Serial—an RS-232 two-position switch permitting either of two serial devices to be accessed from the same port;
- Model TS3-1, ABC Parallel—a two-position Centronics parallel switch, permitting either of two parallel devices to be accessed from one port;
- Model TS5-1, ABC Coaxial—using BNC coaxial connectors, this unit switches the center conductor and shield between two devices from one input source.

For applications requiring a TNC interface, the latter model is designated TS5-1T.

The serial and parallel ABC switches feature gold-plated contacts at the connectors and a sealed, self-wiping rotary switch. They are enclosed within impact-resistant ABS plastic cases.
(List Price: TS2-1 $119; TS3-1 $149; TS5-1 $105)
New England Micro Computer Co.
P.O. Box 105
W. Boxford, MA 01885
(617) 352-8152

CIRCLE 790 ON READER SERVICE CARD



SuperCalc Primer, Howard W. Sams & Co., Inc.

PUBLICATIONS

SuperCalc Primer

A handbook designed to help users with *SuperCalc* spreadsheet software and co-written by Mitchell Waite, Sharyn Venit, and Diane Burns. The primer teaches novice users how to begin using *SuperCalc*, guiding users through many kinds of "what-if" problems, investment predictions, and financial models. The primer shows how *SuperCalc* can be used in such everyday chores as setting up a check register to track expenses and reconcile records with the user's bank statement. Also included is a sample general ledger.

The book demonstrates how to create and format worksheets, define formulas, enter data, and so forth. It shows how spreadsheets can be saved and recreated, and modified for new applications. *SuperCalc 2*, an enhanced version of *SuperCalc* that lets users design their own formats for more convenient data entry, is also covered in the handbook. Also included are a number of reference charts to help users locate math and special functions to build their own formulas.
(List Price: $16.95)
Howard W. Sams & Co., Inc.
4300 West 62 St.
Indianapolis, IN 46268
(317) 298-5400

CIRCLE 791 ON READER SERVICE CARD

Business Program Portfolio for your IBM PC

A collection of 61 BASIC business programs that explain and assist in computerizing a small business. The book, by George H. Hildebrand, explains how to set up a system for printing business forms, how to create a menu system for programming, and how to secure business records with password programs, examples of which are included.

Program listings are also provided for interest calculation, financial analysis, depreciation, property/real-estate management, cash receipts and disbursement, job costing, and payroll. Programming instructions are documented for implementation and modification by the reader as needed.
(List Price: $15.95)
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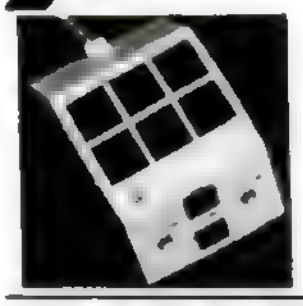
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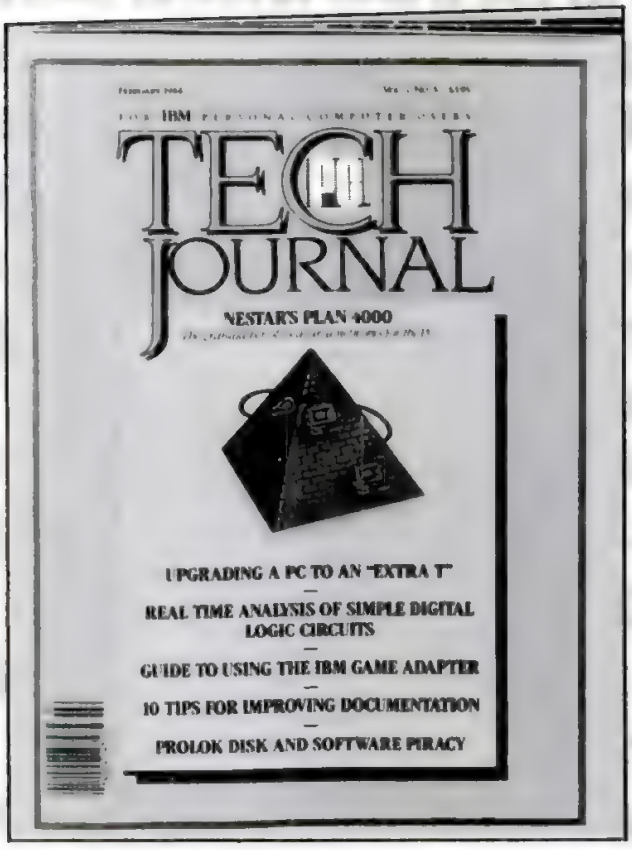
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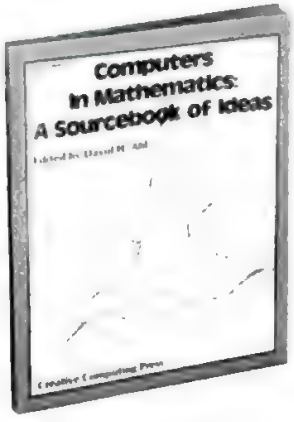
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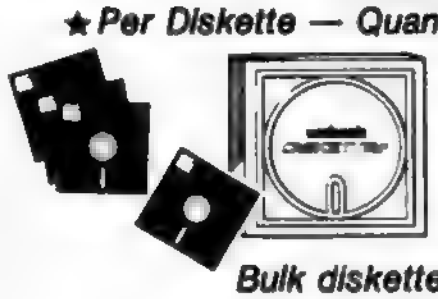
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How to Run a User Group: Fifteen Tips

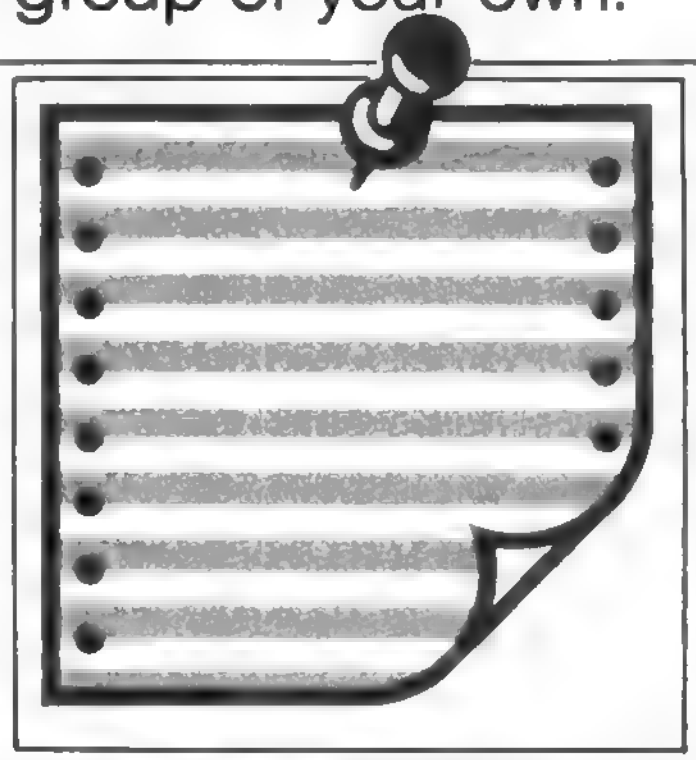
It's no secret that IBM PC user groups are popping up and thriving everywhere. Here are practical suggestions on how to run a successful user group of your own.

User groups are integral to the personal computer industry, and participating in one can be a rewarding experience. I have watched the IBM PC User Group of the Boston Computer Society, which I belong to, grow from a few hundred people 2 years ago to over 3,500 members. During that time I have obtained more tips on using my PC than I can count. I've also found sharing my own expertise to help other people's problems particularly gratifying.

Over the months I have been in touch with other user groups across the country, and I've learned a few tips on managing a successful group. Perhaps these tips will help you to run a successful group.

Success from the Start

• **Establish your group's purpose from the start.** Members have different reasons for joining. Some come looking for free software, others, to make business contacts. Some members may have specific problems with their machines. While others may want to help solve those problems. Naturally, everyone wants to find a user group that meets their particular needs. Be explicit about the purpose of the group and *write it down*. Purposes and goals have a tendency to change unless they are documented.



• **Make sure all the members understand and agree with the group's purpose.** Develop a group consensus on why you are together. Distribute your written goals to newcomers so they share the same expectations from the start. A certain amount of dissension provides the spark of motivation needed to creatively adapt to a fast-paced industry, but it can get out of control and cause problems. If you need to change the group's purpose, do so, but don't let dissatisfaction grow unacknowledged. (You should also be aware that the stated purpose of a group can affect its tax status.)

• **Create a leadership structure that reflects your group's purpose and size.** Most groups have a standard organization of officers that can sometimes foster a sense among the rank and file members that everything is being taken care of from above. This situation creates a heavy burden for the officers and a lack of participation from the membership.

Most users know that the "official" leaders require and appreciate all the help members can provide, but the willingness to volunteer is diminished when someone else appears to be responsible. With this in mind, your group might want to structure itself as a self-help organization that depends on everyone's participation.

My group, the IBM PC User Group of the Boston Computer Society, does not have officers. Instead, it has approximately 40 volunteers who each coordinate a particular area of the group's activities. These volunteer coordinators meet periodically to discuss and share viewpoints, but decisions are usually made only by those directly involved in the particular area concerned. This approach also helps spread the workload so that the coordinators can still enjoy the group.

• **Orient your group toward newcomers.** New users seek the information sharing that is the essence of a user group. They are the lifeblood of a healthy, growing group. In addition to providing new ideas, new questions, and a new source of volunteers. Without new volunteers universal burnout is quickly achieved.

• **If vendors address your group, keep the presentations short.** Face it, you can't interest all the people all the time. You might think that everyone is interest-



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CLUB NEWS

ed in printers, because everyone needs at least one. But, don't forget that those who need one probably already have one. Don't bore your user group with hours of printer talk. Keep formal presentations down to 15 or 20 minutes.

- **Encourage software and hardware demonstrations, but not on center stage.** A user group meeting without demonstrations is like a cocktail party without cocktails. Active participation demos are even better than self-running exhibits. But don't schedule demonstrations for the entire group at once. Only those in the first row will be able to see them. Instead, run demonstrations continually, off to the side of the room, so those who are interested can check them out in detail.
- **Include question-and-answer sessions in your meeting.** One of the most popular aspects of our monthly meeting is when members take the floor to ask for information or help with a specific problem. They often find immediate solutions from other members in the room.
- **Establish a newsletter.** Even a one-page meeting announcement and report of past activities binds the group together. It doesn't have to be fancy, either. Our newsletter runs to 60 pages, but, except for advertising, it is printed entirely on a dot matrix printer.

Newsletters can also be used for publicity: You can circulate extra copies to local computer stores.

- **Consider nonprofit status.** Carefully research the benefits of incorporating as a nonprofit organization. This may not pay for small groups because the cost in both time and effort can be enormous. (For further information, see "A Taxing Question: Exemptions for User Groups," *PC*, Volume 3 Number 3.) This article details one group's struggle with this problem and gives pointers on how to file. One way around the problem is to associate with an established nonprofit organization.
- **Actively seek donations of facilities and services.** If you cannot obtain outright donations, pursue an exchange of services to obtain what you need. Recog-

nize that you have a valuable asset in the collective knowledge of your members. You might be surprised at the demand for that knowledge in the surrounding business and academic communities. The group's newsletter is another often-overlooked financial asset. It has a highly focussed audience that many companies are trying to reach. Your group may be able to use advertising revenue to fund its activities.

• **Find appropriate meeting facilities.** Nothing hinders a meeting more than a cramped, overheated, and underventilated meeting room. Make sure to have plenty of table space and accessible power outlets for demonstrations. Also, don't forget space to receive new members and for special-interest groups. Small user groups can easily start in a living room, but plan to move to larger quarters before the need becomes critical.

• **Contact and develop good relationships with local vendors.** Local computer stores and software vendors can help user groups in many ways. A good working relationship with them can be invaluable in obtaining industry information and recruiting new members.

Many stores view the local user group as an extension to their customer-support services, so it's important to maintain your independence. Don't let your group become known as the Computerland Computer Club unless you want only those who purchased their computers there to join.

• **Establish contact with other user groups.** "How-to" instructions for accomplishing small but valuable operations with your computer, industry rumors, and bug fixes for popular programs are available from other groups. Establish a newsletter exchange with as many groups as possible. *PC's* list of user groups (which was published in "Club News" through *PC*, Volume 3 Number 10 and will be updated periodically), is a good place to start looking for contacts.

• **Take a stand on software piracy.** Whenever someone quietly asks me if our group can help them make a copy of a popular program, I state emphatically that we don't do that. We don't want to subvert the success of the software developers who help make our machines useful. Most IBM PC user groups I know have similar policies.

User groups are not gatherings of neighborhood kids playing games and trying to collect as much software as possible. They are associations of businesspeople and professionals who often depend on their machines for their livelihoods. Only by fostering this image can we remove the notion that a user group is nothing but a "den of thieves."

The group should have every software contributor warrant that the program is indeed in the public domain.

• **Remember that some "public domain" software is in fact copyrighted.** Be careful when collecting software for redistribution. It is easy to allow a proprietary or copyrighted program to slip unnoticed into your group's collection. Consider yourself lucky if withdrawing the software is the only repercussion of such a slip. The group should have every software contributor warrant that the program is indeed in the public domain. Distributing a legal disclaimer with all software is also good protection.

These guidelines should help you avoid some of the typical pitfalls that user groups encounter. With proper care and feeding, your user group can be a healthy and effective organization. ■

Doug Chamberlin is a Boston-based consultant with Chamberlin Computer Services. He specializes in applications development for the PC.

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What's on the Menu?

The author's MENU program will allow you to install on each of your disks a menu listing up to 40 BASIC programs that you can access at the simple touch of a function key.



Would you like to be able to call up your BASIC programs at the touch of a button? Here's a way to do it. The MENU program listed in this article will produce a screen displaying up to 40 programs on a disk, and let you run any of them by pressing a function key. The program also displays the time and date on the lower right-hand corner of the screen.

The menu displays the names of the BASIC programs on your disk and associates each with a key or key combination. The program can handle up to 40 selections through the use of the Shift, Ctrl, or Alt keys with one of the ten function keys. To run a program, you simply press the appropriate key. Note that all of the keys used to make menu selections are grouped together at the left end of the keyboard for convenient one-hand operation.

The program will occupy only about 4,000 bytes on your disks if you leave out the comment statements. I usually store MENU as the first program on each disk. Then, when I change disks, I press F1 to display the menu of the new disk. This procedure makes it easy for me to keep programs on several different disks and swap them back and forth, while still being able to view the menu of the current disk.

To install the program on a disk, type it in and save it under the file name MENU. Then type LIST 240 and use the screen editor to type the disk title that you would like displayed after the word DATA. After you edit the DATA statement, save the program again. Then run the program and a menu of programs on the disk will be displayed on the screen.

The MENU program can be placed on another disk if you first load the program, then press the Esc key, put in the new disk, list and edit line 240 to insert the new disk's title, and then save MENU on the new disk.

The best way to have the menu appear every time you start up is to use DATE/TIME/BASICA MENU as an AUTOEXEC.BAT routine. If you choose to bypass the PC-DOS DATE and TIME routines at startup, however, a simple BASIC program called TIMESET (Figure 1) can be used to enter the time and date as

```
=======================================

10 'program for setting time and date
20 CLS:WIDTH 80
30 PRINT "Current Time = ";TIME$
40 INPUT "Enter new time (HH:MM)
    [press CR for same]: ", IN$
42 IF IN$ = "" THEN GOTO 50
45 TIME$=IN$
50 PRINT
60 PRINT "Current Date = ";DATE$
70 INPUT "Enter new date (MM-DD-YY)
    [press CR for same]: ", FATE$
72 IF FATE$="" THEN GOTO 80
75 DATE$=FATE$
80 RUN "MENU" :END
```

Figure 1: *A simple BASIC program, TIMESET, can be used instead of DOS routines to enter the time and date.*

Illustration: Michael Ng

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```
1 'This is a menu program with space for up to 40 programs
2 'It also includes a time display program.
3 'Version 3.10 November 7, 1983
4 'Copyright 1982,1983 by Robert R  Stitt
5 'Automatically reads files from the disk.
8 'Works with both DOS 1.1 and DOS 2.0
9 '
10 DIM PROG$(40),A$(25)
20 DEFINT A-Z
30 WDTH = 80 TRUE = -1 FALSE = NOT TRUE  DOS2.0 = FALSE
35 DISK.SPACE.LEFT$ = ""
40 IF LEFT$(TIME$,4) = "00:0"
   THEN SKIP.TIME = TRUE ELSE SKIP.TIME = FALSE
50 GOSUB 32000 ON ERROR GOTO 0  'check for BASIC or BASICA
60 SCREEN 0,0,0,0 WIDTH WDTH.KEY OFF
70 GOSUB 31000 'check monitor type
80 IF BASIC = TRUE THEN 110
90 FOR I = 1 TO 10 KEY (I) OFF:KEY I,"":NEXT I
95 REM  line 90 turns off key traps (if any)
100 GOTO 120
110 FOR I = 1 TO 10:KEY I,"".NEXT I ' turns off keys
120 GOSUB 31100 ' check for DOS version
125 '
180 'data reading section
185 'disk title is read from a data statement
190 'and program names are read from the disk
195 '
200 READ DISK$    ' DISK$ is the title of your disk,
205 ' read from the DATA in line 240
210 ON ERROR GOTO 1000
215 '
220 ' line 240 is the title of the disk plus any id number
225 ' keep the title/id shorter than 60 characters
230 ' so it will fit the screen
235 '
240 DATA "PC MAGAZINE MENU PROGRAM: YOUR TITLE HERE"
245 '
250 GOSUB 30000 'get program names from disk
285 '
290 'screen display section
295 '
300 ON ERROR GOTO 0:CLS:
    LOCATE 1,(WDTH-LEN("WELCOME TO THE "+DISK$+"."))/2
305 PRINT "WELCOME TO THE "+DISK$+".";
310 TITLE$= "Use Function Keys to select the desired program."
320 LOCATE 2,(WDTH-LEN(TITLE$))/2:PRINT TITLE$,
330 HEAD$(1)="":HEAD$(2)=" "+CHR$(24)+" ":
    HEAD$(3)="<CTRL>":HEAD$(4)="<ALT>"
340 FOR I = 1 TO 4:LOCATE 3,I*20-19:COLOR 0,7:
    PRINT HEAD$(I):COLOR 7,0:NEXT I
350 PRINT TAB(21)"+";TAB(42)"+";TAB(63)"+";
360 FOR I = 1 TO 10
370 LOCATE (4+(2*I-1)),1:COLOR 0,7:
    PRINT " F"+STR$(I)+" ";:COLOR 7,0
375 PRINT SPACE$(1)+PROG$(I);
380 LOCATE (4+(2*I-1)),20:COLOR 0,7:
    PRINT " F"+STR$(I)+" ";:COLOR 7,0
385 PRINT SPACE$(1)+PROG$(I+10);
390 LOCATE (4+(2*I-1)),40:COLOR 0,7:
    PRINT " F"+STR$(I)+" ";:COLOR 7,0
395 PRINT SPACE$(1)+PROG$(I+20);
400 LOCATE (4+(2*I-1)),60:COLOR 0,7:
    PRINT " F"+STR$(I)+" ";:COLOR 7,0
405 PRINT SPACE$(1)+PROG$(I+30);
410 NEXT I
420 LOCATE 25,1 PRINT "Press ";:COLOR 0,7:
    PRINT "<ESC>";:COLOR 7,0
```

Figure 2: *The MENU program.* *(continues)*

```
425 PRINT " to exit to BASIC. ",
430 IF DOS2 0 THEN PRINT SPACE$(4);DISK.SPACE.LEFT$;
485 '
490 ' keyboard input section
495 '
500 GOSUB 33000:IN$=INKEY$
510 IF IN$ = CHR$(27) THEN GOSUB 700 :GOTO 34000 ' end
520 IF LEN(IN$)<>2 THEN GOTO 500
540 SCAN CODE = ASC(RIGHT$(IN$,1))
550 IF SCAN CODE >= 59 AND SCAN.CODE <69
    THEN CASE = SCAN.CODE - 58
560 IF SCAN CODE >= 84 AND SCAN.CODE <114
    THEN CASE = SCAN.CODE - 73
570 IF SCAN CODE < 59 OR SCAN.CODE > 115 OR (SCAN.CODE > 68
    AND SCAN CODE < 84)   THEN 500
580 IF PROG$(CASE) = SPACE$(8) THEN GOSUB 1100: GOTO 420
    'if the file name is blank, start over.
585 '
590 ' turn the keys back on and run the selected program
600 '
610 GOSUB 700:RUN PROG$(CASE)
615 '
690 ' subroutine for graceful exit;
695 ' resets soft keys and turns them back on.
698 '
700 KY$(1)="LIST"+CHR$(32)
710 KY$(2)="RUN"+CHR$(13)
720 KY$(3)="LOAD"+CHR$(34)
730 KY$(4)="SAVE"+CHR$(34)
740 KY$(5)="CONT"+CHR$(13)
750 KY$(6)="EDIT"+CHR$(32) ' this is changed from BASIC
760 KY$(7)="WIDTH 80"+CHR$(13) ' this is changed too
770 KY$(8)="WIDTH 40"+CHR$(13) ' so is this
780 KY$(9)="RUN"+CHR$(34)+"MENU"+CHR$(13) ' and this
790 KY$(10)="SCREEN 0,0,0"+CHR$(13)
800 FOR I = 1 TO 10
810 KEY I,KY$(I):IF BASIC = TRUE THEN 830
820 KEY (I) ON
830 NEXT I
840 RETURN
950 '
990 'error trap if no DATA in 240
995 '
1000 RESUME 300
1005 '
1090 'subroutine/error trap for "File not Found"
1095 '
1100 BEEP
1110 LOCATE 25,1:PRINT SPACE$(30);
1120 LOCATE 25,1:COLOR 23:
     PRINT "File Not Found!!";:COLOR 7
1140 FOR T = 1 TO 2000:NEXT T
1150 LOCATE 25,1:PRINT SPACE$(30);:RETURN
29000 '
29990 ' subroutine for reading FILES
29995 '
30000 CLS:IF IBMMONO THEN COLOR  0,0
      ELSE SCREEN.0,0,1,0
30001 'if color monitor, hide FILES in screen buffer
30002 'else make them invisible.
30005 IF DOS2.0 THEN A = 2 :B = 4 :C = 10
      ELSE A = 1 :B = 6 :C = 13
30010 FILES"*.bas"
30020 FOR Y = A TO 12
30030 A$(Y) = ""
30040 FOR X = 1 TO 80
30050 A$(Y)=A$(Y)+CHR$(SCREEN (Y,X))
30060 NEXT X
```

(Figure 2 continues)

desired.

I originally wrote this program (Figure 2) using PC-DOS 1.1. But because in PC-DOS 2.0 the display format of FILES is different, I have modified the program so it can be used with either version of PC-DOS. Now the MENU program uses the FILES statement to test for the presence of PC-DOS 2.0. If it finds 2.0, it reformats the data gathering process. The MENU program also takes advantage of PC-DOS 2.0 features to display the amount of space remaining on the disk.

Function Key Routines

Lines 500 to 570 read the keyboard. The routine recognizes only the function keys. The key trap uses the INKEY$ function to obtain the key code, which selects the program name desired.

Line 610 runs the selected program, but first calls up the subroutine at line 700, which permits you to exit MENU gracefully. The subroutine resets the function keys and turns them back on.

At lines 750 to 780, I have changed some of the function key assignments from those supplied by BASIC to run functions that I use more often. For example, pressing the F9 key now has the effect of running MENU.

A Key Trapping Technique

The method used here for key trapping can be used in other programs to extend the number of function keys from 10 to 40. However, you can only use it when you do not need to be able to trap a key at any time, but can wait until the program expects some keyboard entry. Since this method of key trapping works with BASIC, BASICA, and even Cassette BASIC, it can be used when more sophisticated key traps are not available.

The key trap in this program works only during the execution of line 310. (The special key traps in BASICA, however, can function at any time during the program, since they check key status at the beginning of every line, and will branch immediately to a subroutine.) The IN-

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MENU

```
30065 IF NOT DOS2.0 THEN GOTO 30070
30067 FOR I = 4 TO 10 :IF MID$(A$(Y),I,5) = "Bytes"
      THEN DISK.SPACE.LEFT$ = LEFT$(A$(Y),19):GOTO 30130
      ELSE NEXT I
30070 FOR Z = 1 TO 6
30080 IF Z+(B*(Y-A))>40 THEN GOTO 30130
30090 PROG$(Z+(B*(Y-A)))
       = LEFT$(MID$(A$(Y),(C*(Z-1))+1,12),8)
30100 IF INSTR(MID$(A$(Y),(C*(Z-1))+1,12)," BAS")<>0
      THEN PROG$(Z+(B*(Y-A)))=SPACE$(8):GOTO 30130
30110 NEXT Z
30120 NEXT Y
30130 CLS:SCREEN 0,0,0,0:COLOR 7,0
30140 RETURN
30900 '
30990 'check for monitor type
30995 '
31000 DEF SEG = 0
31010 IF (PEEK(&H410) AND &H30) = &H30
      THEN IBMMONO = TRUE  ELSE IBMMONO = FALSE
31020 RETURN
31025 '
31090 ' check for DOS version
31095 '
31100 CLS:IF IBMMONO
      THEN COLOR  0,0   ELSE SCREEN 0,0,1,0
31105 ON ERROR GOTO 31145
31110 CLS:FILES "*.BAS"
31120 IF SCREEN(1,3)=ASC("\")
      THEN DOS2.0 = TRUE  ELSE DOS2.0 = FALSE
31130 CLS:SCREEN 0,0,0,0:COLOR 7,0
31140 RETURN
31145 ON ERROR GOTO 0:RESUME 31120
31980 '
31990 ' check for BASIC or BASICA
31995 '
32000 ON ERROR GOTO 32020:PLAY ""
32010 BASIC = FALSE :RETURN
32020 BASIC = TRUE:RESUME 60
32980 '
32985 ' Subroutine for displaying time
32990 ' within a program on screen line 25.
32995 ' Called from the main program loop.
32996 '
33000 ON ERROR GOTO 0
33010 IF VAL(MID$(TIME$,4,2)) = LAST.TIME THEN RETURN
33020 XCRSR = POS(X):YCRSR = CSRLIN:
      CLMN = WDTH - (LEN(TIME$) + LEN(DATE$) + 1)
33030 NEW.TIME$ = LEFT$(TIME$,5):
      LAST.TIME = VAL(RIGHT$(NEW.TIME$,2))
33040 HOUR = VAL(LEFT$(NEW.TIME$,2))
33045 IF HOUR = 0 THEN HOUR = 12:APM$ = "AM ":GOTO 33070
33050 IF HOUR > 12 THEN HOUR = HOUR - 12:
      APM$ = "PM ":GOTO 33070
33060 IF HOUR = 12 THEN APM$ = "PM " ELSE APM$ = "AM "
33070 HR$ = STR$(HOUR):
      NEW.TIME$ = HR$ + RIGHT$(NEW.TIME$,3) + APM$
33080 LOCATE 25,CLMN,0:COLOR 15,0:
      IF NOT SKIP.TIME THEN PRINT NEW.TIME$;
33090 IF LEFT$(DATE$,2) <> "00" THEN PRINT DATE$;
33100 LOCATE YCRSR,XCRSR,1:COLOR 7,0:RETURN
33110 '
34000 CLS:END
```

(Figure 2 ends)

KEY$ function gets keyboard data; if it is a null string, the program loops back to the same line to keep the program at this point.

You can use this technique to design a data entry routine that completely relabels all of the keys on the keyboard—or to selectively install special keys for a foreign language. ■



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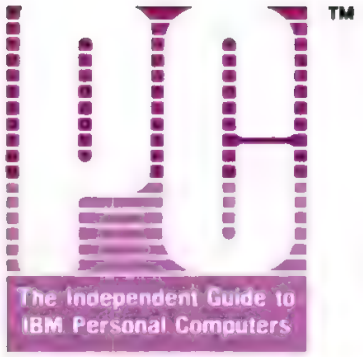
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	Own	*Plan to Buy*
IBM PC	A	G
IBM XT	B	H
PC*jr.*	C	I
3270 PC	D	J
XT/370	E	K
Other (specify)	F	L

2 For what, if any, business application(s) do you use the microcomputer you currently own?_____

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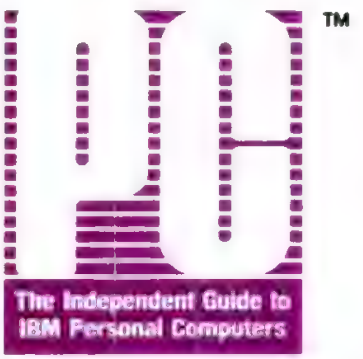
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3270 PC	D	J
XT/370	E	K
Other (specify)	F	L

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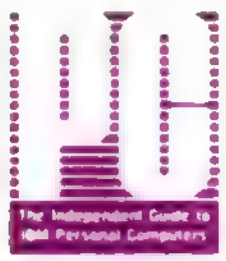
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MAXELL	SS/DD	220	27
	DS/DD	330	39

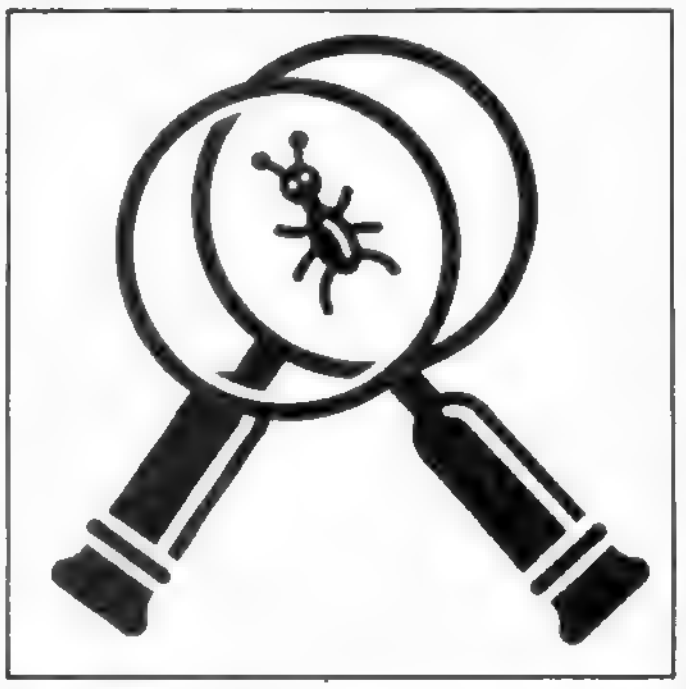
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CIRCLE 386 ON READER SERVICE CARD

User-to-User

PC readers use this forum to help one another by passing along their questions, solutions, comments, and complaints.



dBASE BASICs

In a recent "PC Tutor" column (*PC*, Volume 3 Number 7), a reader asked how to read *dBASE II* files from BASIC. I was faced with the same problem, and came up with a simple solution for use with the interpreter only; this will not work with the compiler.

dBASE II files have a 521-byte header, containing the number of records in the file, the record size, the update date, and the file structure. The data records start at the 522nd byte in the file, and have a 1-byte flag prefixed to every record. This flag contains an asterisk (*) if the record was deleted in *dBASE II*, and a blank otherwise.

The way to read a *dBASE II* file is as a random file in BASIC. The problem is that the file has two record lengths—that of the header and that of the records themselves. The only way around this is to treat the file as a collection of 1-byte records. But then the FIELD statement will only let you define a 1-byte field, thus you can only read data one byte at a time. It is a very messy job to put the records together. However, with the trick I am about to describe, you can define the data structure in the FIELD statement to describe the real record format, while DOS and BASIC access the file as if the records are only one byte in length. You merely lie a bit!

What you do is open the file with the length of your data record as the LEN parameter. Then you describe your data structure with a FIELD statement. Then you change the record length of the file in the DOS FCB (File Control Block) to one byte. Now the GET statement will behave as if the file had 1-byte records, letting you position the file to any byte you wish. Positioning the file with GET causes the structure defined by the FIELD statement to point to that position in the buffer. Since DOS and BASIC read an entire sector into the buffer, even though the record length is one byte, you can access more than one byte in the buffer through the FIELD variables.

In the program segment in Figure 1, I am assuming we have a name and address file with 50-byte records—a 20-byte name and a 30-byte address—and that we wish to print the entire file.

As mentioned above, this will not work with the BASIC compiler. I have written some assembly-language subroutines that can be called from compiled BASIC programs to allow you to read a *dBASE II* file sequentially using DOS 2.0 or above, but they are too long to publish here. If you wish to obtain these, send $10 to the address below and I will send you a diskette with the assembler source, the object

modules, documentation, and a sample program.

Larry Bradley
1377 Chartrand Ave.
Orleans, Ontario K1E 1H9 Canada

If you try this with your own dBASE II *files, you'll have to make several changes in the program: (1) Substitute the actual record size of your* dBASE II *file in place of the 51 in line 170. (2) Replace the "NAMEFILE.DBF" in line 190 with the name of your* dBASE II *file. (3) Instead of 20 as FIELD1$ and 30 as FIELD2$ in lines 290 and 510, insert the actual field-names and field widths from your* dBASE II *file that you want to examine. You can adapt this program to read* dBASE II *files and create BASIC files. Or you could use it to bang out a quick set of mailing labels, or perform exotic string manipulations that would be hard to do in* dBASE II. *Remember that if your record size is greater than 128, you'll have to use the /S: option. For instance, if your record size is 144, get into BASIC by typing BASIC /S:144.*

FAT Chance

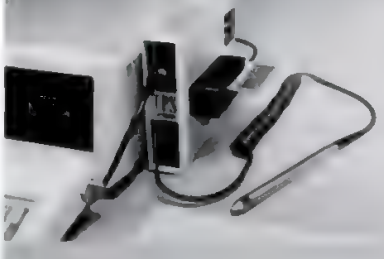
I recently wiped out the contents of a friend's hard disk and would like to warn others so it doesn't happen to them.

```
100 ' BASIC dBase II Accesser -- by Larry Bradley
110 '
120 DEFINT A-Z
130 '
140 'Open the file with length equal to the real record length
150 'Note one extra byte for the DELETED flag
160 '
170 RECORD.SIZE = 51
180 '
190 OPEN "NAMEFILE.DBF" AS #1 LEN = RECORD.SIZE
200 '
210 'Define the structure of the start of the dBase header.
220 'We want to extract the number of records in the file.
230 '
240 FIELD #1, 1 AS JUNK$, 2 AS NUMBER.RECORDS$
250 '
260 'Define the structure of the database record. The first byte
270 'is the DELETED flag
280 '
290 FIELD #1,1 AS DELETED$,20 AS FIELD1$, 30 AS FIELD2$
300 '
310 'Now find the BASIC FCB, and change bytes 15 and 16, which
320 'have the record length, from the current value of 51 to 1.
330 '
340 FCB = VARPTR(#1)
350 POKE FCB+15,1
360 POKE FCB+16,0
370 '
380 'Now position the file to the first 'record' (actually the
390 'first byte) and extract the file size from the header
400 '
410 GET #1,1
420 NUM.RECORDS = CVI(NUMBER.RECORDS$)
430 '
440 'Read the file sequentially; there are NUM.RECORDS records
450 'in the file. The GET statement will position us at any
460 'byte in the file, since DOS thinks the records are one
470 'byte long. The first record starts at byte 522.
480 '
490 FOR I = 1 TO NUM.RECORDS
500   GET #1,522+(I-1)*RECORD.SIZE
510   IF DELETED$ <> "*" THEN PRINT FIELD1$,FIELD2$
520 NEXT I
530 END
```

Figure 1: *A program for accessing* dBASE II *files in BASIC.*

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CIRCLE 119 ON READER SERVICE CARD

USER-TO-USER

My friend has a PC-XT, which he was using to beta test a physician's billing program. Since this program was designed so that inexperienced doctors could not easily enter DOS and see what was on the hard disk, I used my own DOS disk to boot the machine.

Unfortunately, my DOS disk has a CONFIG.SYS file on it designed for my own PC, which has a 23-megabyte Pegasus hard disk. Before I realized what was happening, my CONFIG.SYS file established a new file allocation table (FAT) on my friend's hard disk. Once this was done, there was no way to retrieve any files, since the Pegasus FAT was different from the XT FAT. I could retrieve program files that had been written to only once, but all files that he had written to more than once were totally worthless.

Ron Collins
Tulsa, Oklahoma

Indeed a nasty problem, although admittedly an uncommon one. It's a real nuisance to have to check the contents of a CONFIG.SYS file each time you boot; the only real safeguard is to keep disks from one system away from others. The problem is, of course, that mistakes do happen. Backup Your Hard Disk Weekly!

Keyboard Magic

The program in Figure 2 simulates a piano using the PC keyboard for input. Middle C is located at the letter *T* and the numeric keys at the top simulate the sharps and flats within this scale range.

Although only 39 notes are assigned, all keys are activated. Unassigned keys will play the same note as the previous key input. All notes will continue to play until the next note is entered. The spacebar is programmed to break the note or stop the tune. Pressing the End key after the spacebar will terminate the program.

To add a little flexibility, the function keys can be programmed to stack up to 15 notes per key so that favorite tunes can be preprogrammed. (See the "KEY" section in the BASIC manual.)

To vary the sound try changing the constant .985 in line 700 to a 3 and the constant 1.01 in the same line to 5.

R. E. Studwell
Fairfield, Connecticut

```
100 ' IBM-PC Keyboard Piano -- by R. E. Studwell
110 '
120 ' REQUIRES BASICA -- TO END HIT SPACE BAR THEN HIT 'END' KEY
130 '
140 DIM N(40):KEY OFF:CLS:GOSUB 720
150 R=1.05946:N(1)=523.25/6
160 FOR J=2 TO 39:N(J)=N(J-1)*R:NEXT
170 P=.975*N(21)
180 A$=INKEY$:IF A$="" THEN 180
190 IF LEN(A$)>1 THEN 200 ELSE 250
200 XX=ASC(MID$(A$,2,1))
210 IF XX<>79 THEN 250 ELSE END
220 '
230 '  TEST FOR THE NOTE
240 '
250 IF A$="A" OR A$="a" THEN P=N(2) : GOTO 650
260 IF A$="B" OR A$="b" THEN P=N(10): GOTO 650
270 IF A$="C" OR A$="c" THEN P=N(7) : GOTO 650
280 IF A$="D" OR A$="d" THEN P=N(6) : GOTO 650
290 IF A$="E" OR A$="e" THEN P=N(24): GOTO 650
300 IF A$="G" OR A$="g" THEN P=N(9) : GOTO 650
310 IF A$="H" OR A$="h" THEN P=N(11): GOTO 650
320 IF A$="I" OR A$="i" THEN P=N(32): GOTO 650
330 IF A$="K" OR A$="k" THEN P=N(14): GOTO 650
340 IF A$="L" OR A$="l" THEN P=N(16): GOTO 650
350 IF A$="M" OR A$="m" THEN P=N(13): GOTO 650
360 IF A$="N" OR A$="n" THEN P=N(12): GOTO 650
```

(continued)

Figure 2: *PC-PIANO*.

(Figure 2 continued)

```
370 IF A$="O" OR A$="o" THEN P=N(34): GOTO 650
380 IF A$="P" OR A$="p" THEN P=N(36): GOTO 650
390 IF A$="Q" OR A$="q" THEN P=N(20): GOTO 650
400 IF A$="R" OR A$="r" THEN P=N(25): GOTO 650
410 IF A$="S" OR A$="s" THEN P=N(4) : GOTO 650
420 IF A$="T" OR A$="t" THEN P=N(27): GOTO 650
430 IF A$="U" OR A$="u" THEN P=N(31): GOTO 650
440 IF A$="V" OR A$="v" THEN P=N(8) : GOTO 650
450 IF A$="W" OR A$="w" THEN P=N(22): GOTO 650
460 IF A$="X" OR A$="x" THEN P=N(5) : GOTO 650
470 IF A$="Y" OR A$="y" THEN P=N(29): GOTO 650
480 IF A$="Z" OR A$="z" THEN P=N(3) : GOTO 650
490 IF A$="\" THEN P=N(1) : GOTO 650
500 IF A$="," THEN P=N(15): GOTO 650
510 IF A$="." THEN P=N(17): GOTO 650
520 IF A$=";" THEN P=N(18): GOTO 650
530 IF A$="/" THEN P=N(19): GOTO 650
540 IF A$="2" THEN P=N(21): GOTO 650
550 IF A$="3" THEN P=N(23): GOTO 650
560 IF A$="5" THEN P=N(26): GOTO 650
570 IF A$="6" THEN P=N(28): GOTO 650
580 IF A$="7" THEN P=N(30): GOTO 650
590 IF A$="9" THEN P=N(33): GOTO 650
600 IF A$="0" THEN P=N(35): GOTO 650
610 IF A$="[" THEN P=N(38): GOTO 650
620 IF A$="]" THEN P=N(39): GOTO 650
630 IF A$="=" THEN P=1.1*N(37): GOTO 650
640 IF A$=" " THEN 180
650 A$=""
660 '
670 ' NOW PLAY THE NOTE
680 '
690 SOUND P,0:SOUND 32767,1:SOUND P,1
700 SOUND P*.985,1:SOUND P,1:SOUND P*1.01,1
710 A$=INKEY$:IF A$="" THEN 700 ELSE 250
720 LOCATE 20,25 : PRINT "PRESS SPACE BAR TO STOP MUSIC"
730 LOCATE 22,25 : PRINT "PRESS 'END' KEY TO TERMINATE"
740 RETURN
```

```
135 DIM C(500):ON KEY(1) GOSUB 750:KEY(1) ON
685 K=K+1:C(K)=P
705 IF FLAG THEN 740
750 FLAG=-1:FOR E=1 TO K:P=C(E):GOSUB 690:NEXT
```

Figure 3: *Four lines that you can add to the PC-PIANO program in Figure 2 to play back up to 500 notes automatically.*

We've seen dozens of piano programs, but this one has two nice touches. It plays one note until the next key is hit, so notes can be of varying lengths. And it adds a vibrato effect, which gives the notes character. The function key trick is simple, but sort of jazzy too. You might want to play with this to add a display, although a complex display would slow the program down, and it's already no speed demon. To make things faster get rid of some of the key tests or at least put the most frequently used ones near the beginning of the listing. You can also add the four lines in Figure 3, which will let you play back up to 500 notes just by hitting F1. This will replay just the notes and not the duration, however. To incorporate time lags you'd have to capture a counting interval between keystrokes and put this time value for each note into another array.

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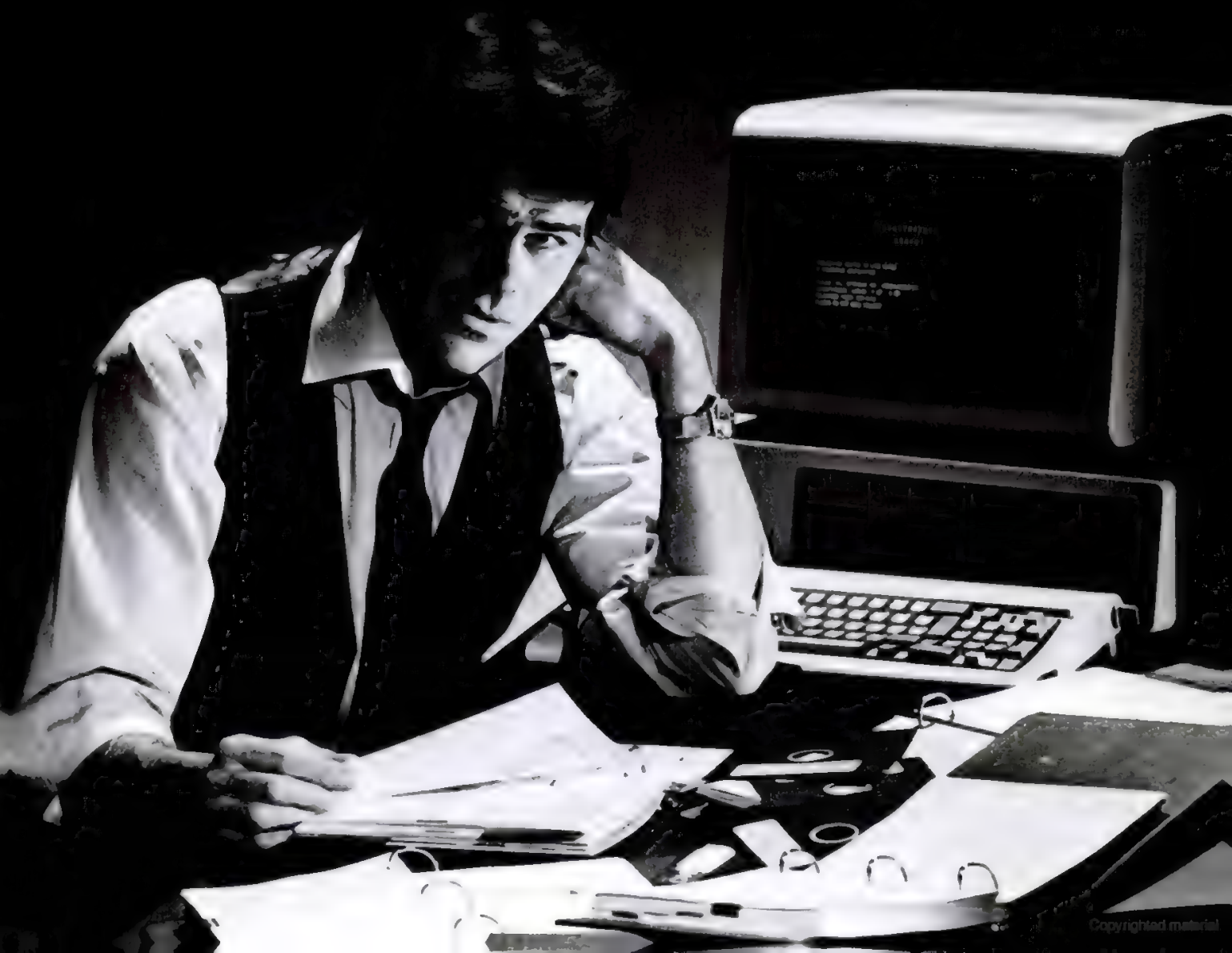
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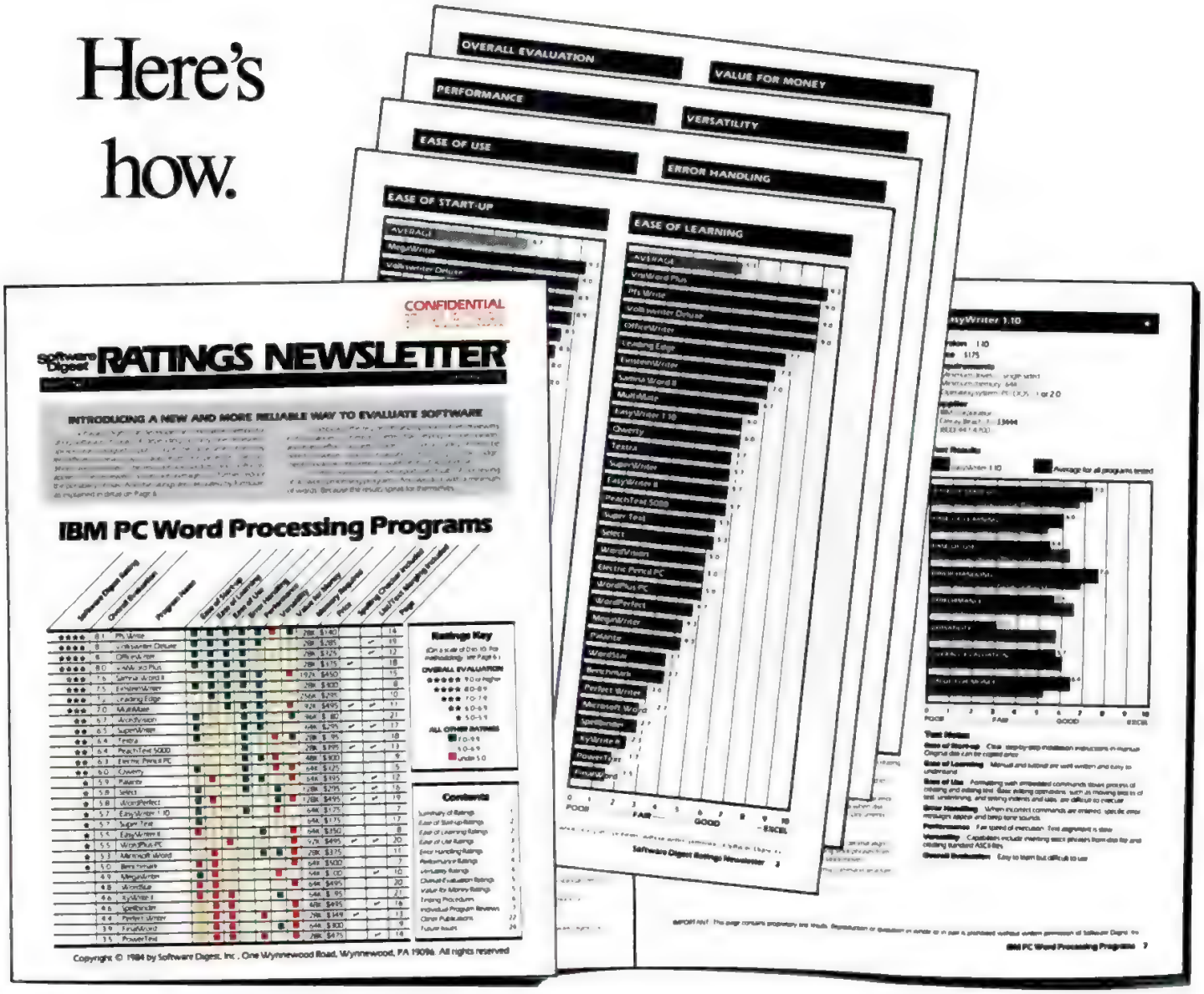
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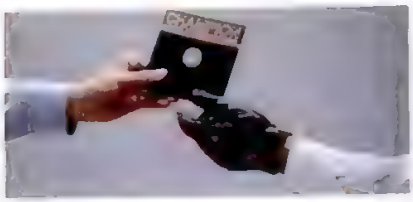
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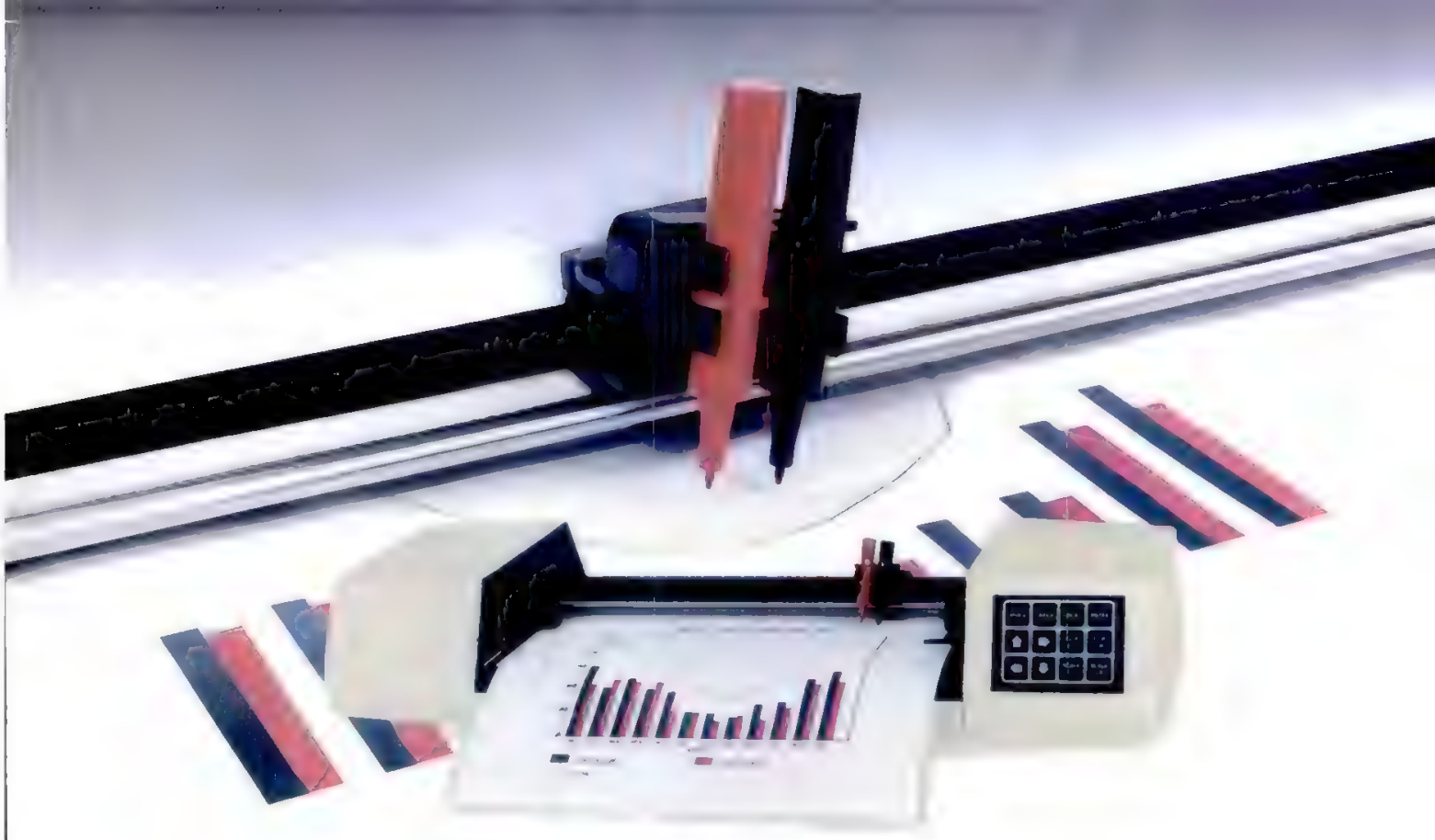
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MARK ZACHMANN

PC Tutor

Light On Pens

Q: I want to use a light pen with my PC. The IBM *Technical Reference* manual, however, doesn't seem to indicate the



desired signals for the light pen input lead and the switch lead. The pin connector has three outputs: ground, +5 volts, and +12 volts. Can you explain to me what inputs are needed?

Phillip E. Gold
Vestal, New York

A: *I assume you want a light pen interface that will signal with a positive-going pulse when light reaches the pen's sensor. In its simplest form, a light pen could be a photocell that sends out a high (+5 volt) pulse when enough light hits the cell.*

In this arrangement, you'd have a switch that connects Pin 1 to either Pin 4 or Pin 5. Pin 4 should be connected to ground and Pin 5 should be +5 volts. Toggling the switch to High, which connects Pins 1 and 5, should get the light pen input to trigger.

An actual light pen for the IBM PC is connected with a 6-pin Berg strip, a single in-line connector like the RF modulator's 4-pin connection.

The PC's light pen input will also support a button on the light pen. This button should be set up to be active low: the signal is at ground level when the button is pushed down and at +5 volts when the button is released.

Here's a BASIC program that will trap a light pen input. In order for this routine to work, you must have a light pen that produces an active low pulse when it detects light, as well as short-persistence phosphor display such as IBM's color monitor.

```
10 PEN ON
20 ON PEN GOSUB 1000
1000 REM read light pen
position
1010 PENXPOS = PEN(1)
1020 PENYPOS = PEN(2)
1030 RETURN
```

Switch-Hitting Screens

Q: Is there a way to use both the color and monochrome screens at the same time, as is done by my Logo interpreter? I remember seeing an article with an assembly language program that used the function keys to switch between screens without erasing them. Is it also possible to do this in BASIC or Pascal instead of assembly language?

Marc H. Simkin
Riverdale, New York

A: *There is a way to switch between monitors, but it isn't very easy. A BASIC program that does this is in Figure 1. It contains three principal subroutines. The first, beginning at line 1000, reads in the pertinent display parameters and stores them in an integer array. The second subroutine, at line 1200, reverses that process; it puts the parameter values back into memory. The third subroutine, at line 1300, assures that the video display is initialized correctly.*

(continued)

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Color Whine

Q: I use my IBM PC's color/graphics board to drive a Zenith ZVM 122 amber monitor. When I power up the system, the power supply emits a high-pitched whining sound and the image on the screen is very unstable. These problems continue for about 5 minutes, then they disappear. Curiously, the whining and image instability also go away whenever the disk drives are spinning.

When I power up the system, the power supply emits a high-pitched whining sound and the image on the screen is very unstable.

The whining doesn't occur when I disconnect the color board before I power up the system. It happens not only with an IBM color board, but with an Eagle board or a Tecmar Graphics Master. A co-worker with the same configuration as mine has exactly the same problem. Is this a common problem with color boards, and is there a way to fix it?

Charles C. Edwards
Alexandria, Virginia

A: *You needn't take these problems for granted. I have used both the IBM and Tecmar boards and never experienced the problems you describe. It sounds as if something is wrong with the video synchronization signals (sometimes called "sync problems," for short).*

I'm suspicious of your being able to power up the system without the color card. The PC's diagnostics should have a trap that stops the power up when it notices the absence of the color board; you should hear a few beeps and the machine should fail to boot up. The configuration switches in your PC may be set incorrectly, so the computer doesn't initialize the color board properly.

If your system has just the color board, set the switches to indicate it's installed. If your system has both boards, color and monochrome, you should make sure the switches are set up to indicate that the monochrome board is present.

If you have an XT or a newer 256K PC, then both display boards are initialized when you power up, irrespective of the switch settings. With the Tecmar Graphics Master, however, some switch settings make the board incapable of being initialized when you power up.

The reason I suspect your system has a sync problem is that a monitor can generate a high pitched whine when it gets a signal input of the wrong frequency. One can easily mistake this monitor whine for a complaint from the power supply.

There are other possible causes: Your PC might not be running at the right frequency—the crystal oscillator circuit needs time to warm up. Or, your color board or monitor may be defective, perhaps with a leaky capacitor. If that's the case, the capacitor might mysteriously heal itself as the computer or monitor warms up. To isolate the problem, try swapping equipment around: for example, use a different monitor or a different PC and see if the problem goes away.

Support for Larger Hard Disks

Q: Is it possible to replace the 10 megabyte hard disk in my IBM XT with a drive of greater capacity? Is the current IBM Fixed Disk Adapter Card capable of supporting higher capacity drives?

Atkins Chun
Dublin, California

A: *Probably. The fixed disk board should be able to support a variety of hard disks, just as the diskette drive board can support different types of drives.*

The Fixed Disk Adapter does have some constraints, though. The card only

has capacity for seven-drive heads (the XT's drive has four heads) and step rates must be 3 milliseconds (ms), 200 microseconds (us), or 70 microseconds.

Also note that the fixed disk BIOS software is in a ROM chip attached to the controller card, and this routine assumes your system has the 10 megabyte disk that comes with the XT. A double-word pointer at 0000:0104 (INT 41h) points to the hard disk drive parameter table. By altering this table, you should be able to make the system support a drive with more cylinders. (See page A-94 in the Technical Reference manual for further information on this parameter table.)

You will also need to change the first sector of the hard disk drive to define the drive parameters for MS-DOS (see page 14-20 in the DOS 2.0 manual for definitions of the BIOS parameter blocks). ■

The PC Tutor solves practical problems and explains points of general interest. If you'd like to see your questions answered here, drop a line to PC Tutor, PC Magazine, One Park Avenue, New York, NY 10016.

```
10   DEFINT A-Z : J = 0
20   DIM MPOS(32,2) : REM  MPOS will contain video info
30   VMODE = 0 :  REM  set up the monitor for monochrome
40   GOSUB 1100 : GOSUB 1000 : GOSUB 1300
50   VMODE = 1 : REM set up the monitor for color
60   GOSUB 1100 : GOSUB 1000 : GOSUB 1300
70   REM  switch back and forth at will
80   INPUT "Color, Monochrome, or Quit";A$
90   GOSUB 1000  :  REM  save parameters
100  IF ("C" = LEFT$(A$,1))  THEN VMODE = 1 : REM color
110  IF ("M" = LEFT$(A$,1))  THEN VMODE = 0 : REM mono
120  IF ("Q" = LEFT$(A$,1))  THEN GOTO 150  : REM quit
130  GOSUB 1200  : REM  to switch parameters
140  GOTO 80
150  END
200  REM   The following subroutines use:
210  REM     VMODE = 0 for the monochrome display
220  REM     VMODE = 1 for the color display
230  REM
1000 REM   subroutine to save parameters
1010 DEF SEG = 64
1020 FOR I = 0 TO 29
1030 MPOS(I,VMODE) = PEEK(73+I)
1040 NEXT I
1050 MPOS(30,VMODE) = POS(0) : MPOS(31,VMODE) = CSRLIN
1060 RETURN
1100 REM  the following is needed to switch modes
1110 DEF SEG = 64
1120 C = PEEK(16)
1130 IF VMODE = 1   THEN  POKE 16,C AND &h20
     ELSE POKE 16,C OR &h30
1140 RETURN
1150 REM
1200 REM  subroutine to reset parameters
1210 DEF SEG = 64
1220 FOR I = 0 TO 29
1230 POKE I+73,MPOS(I,VMODE)
1240 NEXT I
1250 GOSUB 1100 : REM reset equip flag
1260 LOCATE MPOS(31,VMODE),MPOS(30,VMODE) : RETURN
1270 REM
1300 REM  subroutine to make BASIC handle screen
1310 SCREEN 1 : SCREEN 0 : WIDTH 80
```

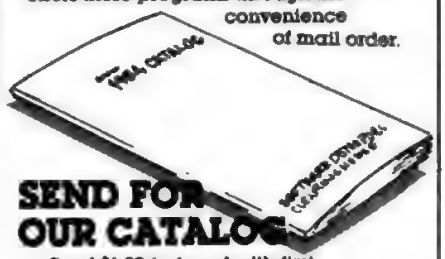
Figure 1: *A BASIC program that permits you to switch between a color and a monochrome monitor.*

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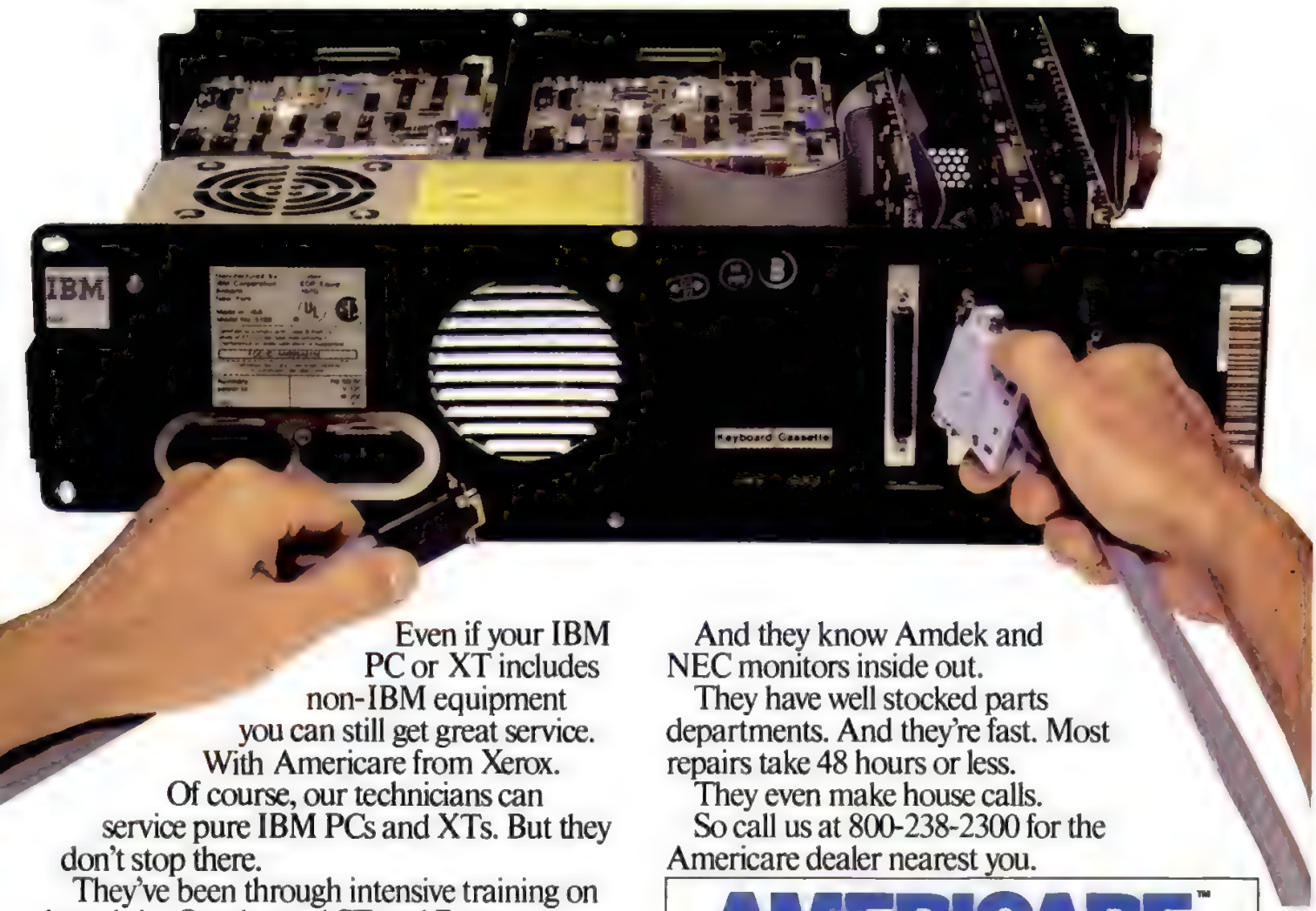
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Top of the Line Standalone Modems

103/212-compatible modems offer the greatest flexibility and the fastest communications. These dual-capability modems may cost more, but in the long run they may turn out to be cheaper.

If you're going on-line and you can afford it, you should buy a combination 103/212-compatible modem. This type of modem offers the greatest flexibility and the fastest communications.

The Bell 103 protocol and Bell 212A protocol are the two most widespread schemes for sending information over phone lines. Bell 103-compatibility makes for less expensive modems and is more common. Bell 212-compatibility costs more, but it enables the modem to send and receive information at four times the speed.

Combined 103/212 compatibility is preferred because the more expensive 212 modem can actually save you money by cutting down on your phone bills, while you may sometimes need 103 compatibility to communicate at all.

Within this category, there are two basic groupings of modems: standalones and modems-on-a-board. I'll discuss the board modems in a future column. Here's a quick look at six standalones.

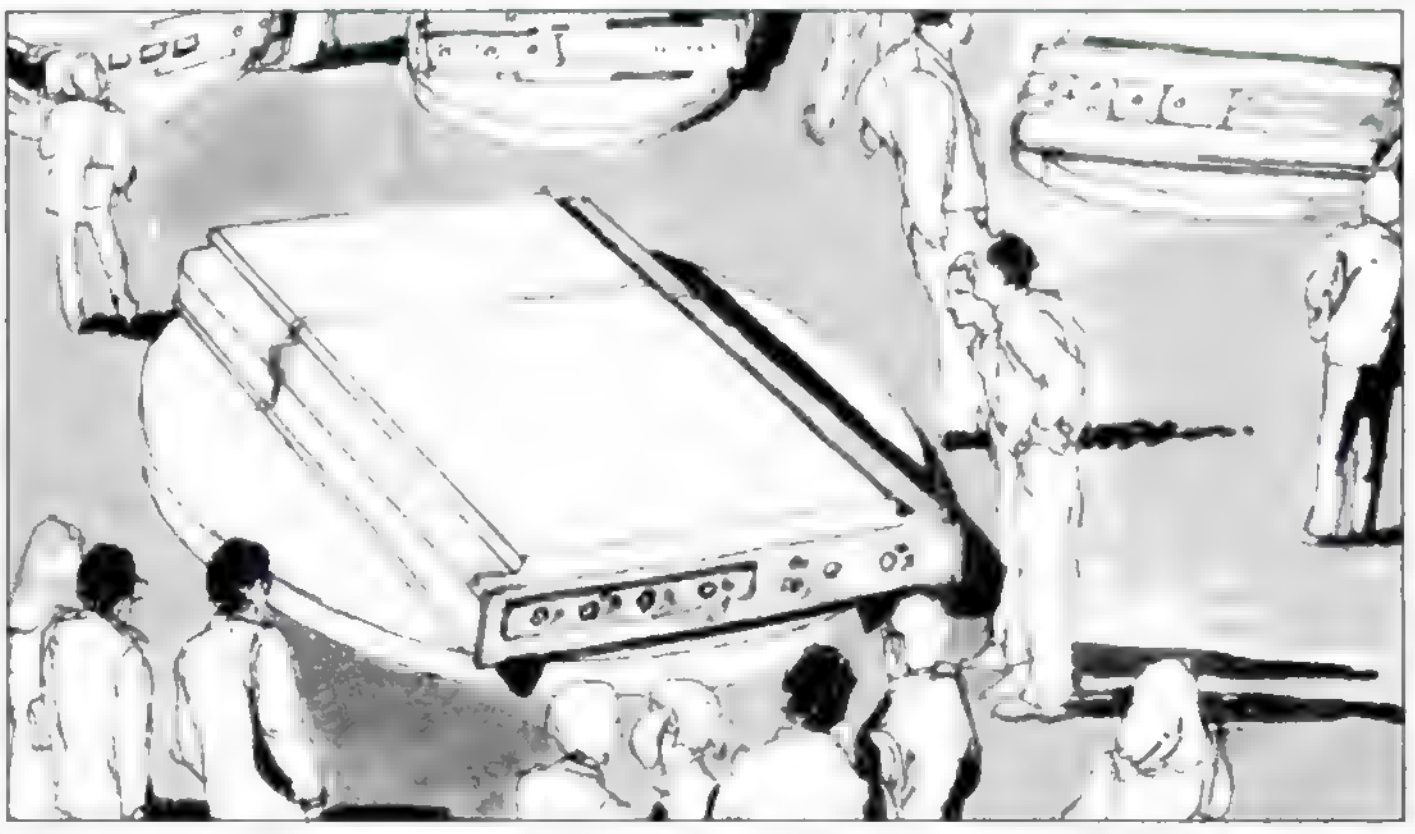


Illustration: Michael Ng

Hayes Smartmodem 1200

This is the standard against which modems are measured. I have played with and reviewed many modems, but this is the one that stays plugged into my machine. Aside from its sleek design, the Smartmodem is a highly flexible piece of equipment. It has 19 BASIC commands and 16 different registers that give you control over such things as which ring to pick up on in auto-answer mode. It also has five different modes of operation: manual originate, manual answer, auto-dial, auto-answer, and reverse auto-dial (in which the modem will dial and then go into answer mode). Eight status lights keep you posted on what's going on. I particularly appreciate the auto-answer light that tells me when the modem is set to answer the phone. This prevents such unpleasant surprises as the modem picking up the phone and squealing into some unsuspecting caller's ear.

The "smarts" in the Smartmodem let you control the modem from the computer instead of fumbling with mechanical switches on the modem itself. The Hayes is popular enough so that a fair number of communications programs have been written specifically for it.

The Smartmodem's manual has been justly criticized as a hacker's delight and a user's nightmare. Even so, it is better than many others I've seen. The Hayes Smartmodem lists for $699 from Hayes Microcomputer Products, Inc., 5923 Peachtree Industrial Blvd., Norcross, Georgia 30092, (404) 449-8791.

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might end up with something like the Bizcomp 1012. But only if you did the job extremely well. The Bizcomp is different from the Hayes and it costs $150 less, but in some respects the two are comparable.

The differences tend to cancel each other out. The Bizcomp does not have a reverse auto-dial mode, but it does have a repeat auto-dial mode. Unfortunately, programs designed to work with the Hayes will not necessarily work with the Bizcomp. You may be forced to control the Bizcomp from the keyboard.

Whether or not you consider the Bizcomp's lack of status lights important is a matter of personal taste—not unlike whether or not you want a tachometer in your car. Be aware also that the Bizcomp manual makes the Smartmodem manual look good. Bizcomp lists for $549 and is available from Bizcomp Corporation, 532 Weddell Dr., Sunnyvale, California 94086, (408) 745-1616.

Cermetek Info-Mate 212A

This is one of a new generation of intelligent modems that not only does everything the Smartmodem can do but claims to do more. So far I am not impressed by the improvement. Although the Info-Mate contains an on-board memory that can hold up to 52 phone numbers or log-on sequences, chances are that your software will do this for you anyway.

Another feature Info-Mate has that you won't find in the Smartmodem is adaptive dialing. In both products you can give the modem a command for pulse or tone dialing, but you can tell Info-Mate to choose between the two automatically. Each time it hears a dial tone, it will test the waters by tone dialing the first number. If it still hears a dial tone, it switches to pulse. Again, this is nice in theory, but the modem can get confused. Cermetek suggests that if you run into problems dialing, you switch back to giving specific commands for pulse or tone.

Physically, the Info-Mate looks much like the Smartmodem; it's complete with a bank of status lights. These are mostly the same as those on the Hayes product, but there's no auto-answer light. The Info-Mate also has its own set of commands.

The one problem with this modem is its manual, which may even be worse than Bizcomp's. Unless you are already familiar with communications, the documentation won't be too helpful. It lists for $595 from Cermetek Microelectronics, Inc., 1308 Borregas Ave., Sunnyvale, California 94089-3565, (408) 734-8150.

Racal-Vadic Auto-Dial VA212

Another contender in the "smarter than Smartmodem" category is based on a different design philosophy. The first thing you notice about the Auto-Dial VA212 is its size. Where most modems fit nicely under a desk phone, this one is roughly a third again as wide. The extra width is needed because the front panel has 16 control buttons. You can control the Auto-Dial VA212 through software or from your keyboard, and the push buttons give you a third choice.

Like the Info-Mate, the Auto-Dial VA212 has an onboard memory and the ability to choose between pulse and tone dialing on its own. Much more interesting is that the VA212 will give you on-line help with its commands. If you enter a question mark (?) in response to a prompt, the modem will put a menu on your screen. One command will even give you the current settings for all 26 of the modem's options.

The nicest surprise with this modem is its clear, well-written, and heavily illustrated manual. Even if you're new to communications, you should have little trouble with it. This modem also has its own set of commands, so that you can't use it efficiently with software designed for the Hayes. It lists for $695 from Racal-Vadic, Inc., 15245 McCarthy Blvd., Milpitas, California 95035, (408) 946-2227.

U.S. Robotics Auto-Dial 212A

The U.S. Robotics Auto-Dial is a Hayes-compatible modem, which means it shares most of the same commands and

capabilities as the Hayes and will work with most software designed for the Hayes. The most obvious difference between the modems is in appearance. The Auto-Dial 212A is a clunky looking device that you will probably want to hide under your phone. Making up for its lack of good looks is that the on–off switch is on the front panel, where it is easy to get at. The switch on the Hayes is in the back; you have to fumble around to find it.

The Smartmodem has a few commands that you won't find on the Auto-Dial 212A, but these are ones you're not likely to use often. The only important feature missing in the Auto-Dial 212A is the ability to change settings while on-line. With the Smartmodem you can go into command mode, change settings, and go back on-line without breaking the connection; with the Auto-Dial 212A, you can't. On the other hand, the Auto-Dial 212A has a test mode that you won't find on the Hayes. Overall, the features balance each other out, especially when you consider the $100 difference in price. The Auto-Dial 212A lists for $599 from U.S. Robotics, 1123 West Washington, Chicago, Illinois 60607, (312) 733-0497.

U.S. Robotics Password

This modem is basically a stripped-down version of the Auto-Dial 212A. Most differences are minor: The Password is smaller and lighter, it has a plastic case instead of a metal one, and it has the on–off switch in the back. The one major difference is that Password lacks the bank of status lights on the front panel. If this doesn't bother you, then this is probably the modem to get. It gives you Hayes compatibility at a savings of nearly $250. If I had to pick out a best buy, this would be it. It lists for $449 and is available from U.S. Robotics.

This short list does not include all the modems that fall in this category, but it does cover most of the best-known and easiest to find. It should serve as a good starting point if you're shopping for a standalone modem. ■

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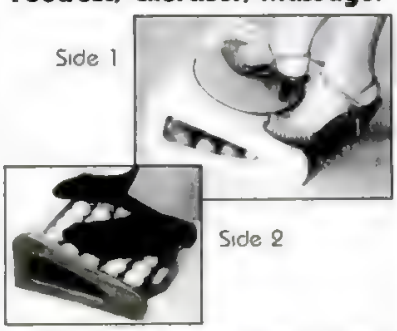
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Jig Jags 2

Like most people, you probably enjoy the challenge of crossword puzzles, but those cryptic clues drive you crazy. For a change of pace, you might turn to a jigsaw puzzle. It is supposed to be a relaxing diversion, but if you've lost that one little piece that goes near the upper right-hand corner, you ruin the whole effect. The drawbacks of crossword puzzles and jigsaw puzzles have been eliminated in a new game: *Jig Jags*, the combination crossword-jigsaw puzzle. Arrange the 16 puzzle pieces on the 7×7 square grid to form a valid crossword puzzle. This issue contains three new puzzles for a refreshing break from those other nerve-wracking pastimes.

Directory Reader

The *PC Disk Magazine* tradition continues with our latest offering in a long line of BASIC utility programs. *Directory Reader* is a must for any file management programs you create. This useful program reads the directory of a diskette or a hard disk into a series of BASIC variables, making directory information available for use in your BASIC programs. This innovation marks a startling departure from the BASIC FILES command, which simply displays your file names but has no provision for using this information. *Directory Reader*'s BASIC program calls up the assembly language subroutine that retrieves your directory information. The BASIC program contains two important routines. The first lets you specify the drive and files you wish to manipulate. The second routine displays your files.

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Columns
The Editor's Wire by Corey Sandler; Junior Explorer by Peter Norton; Screen Play by Don Kennedy; Opinion by Lindsy Van Gelder and Stephen Manes; Education by Martin Porter; Looking at LOGO by Winn L. Rosch; It's BASIC by John Woram; Communications Networks by Eric Freedman; Reader to Reader by Paul Somerson; Q&A by Steve Rosenthal.

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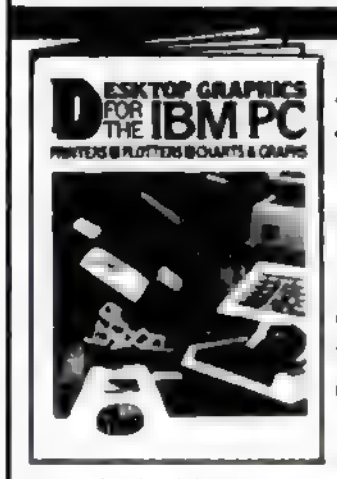
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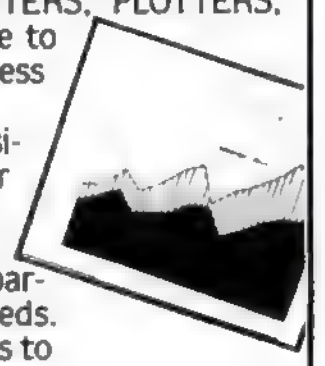
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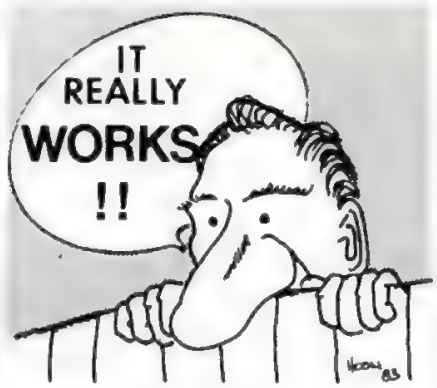
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The dBASE II Universe

The *dBASE II* package has been joined by an army of relational database managers, but so far it has maintained its dominant position among the large-scale systems available for the PC.

PC Tech Journal will devote most of its July issue to *dBASE II*, its file structures, techniques for application developers, and the considerable aftermarket it has spawned.

dBASE II File Structures

A primer on relational database managers, followed by the complete technical details of how information is stored in *dBASE II* files.

Technical Tips for dBASE II Programmers

Input validation should be a part of every *dBASE II* application: a program should respond to input with clear instructions for the operator. *Tech Journal* will show you techniques that are applicable to most forms of input.

Multiple Indexes

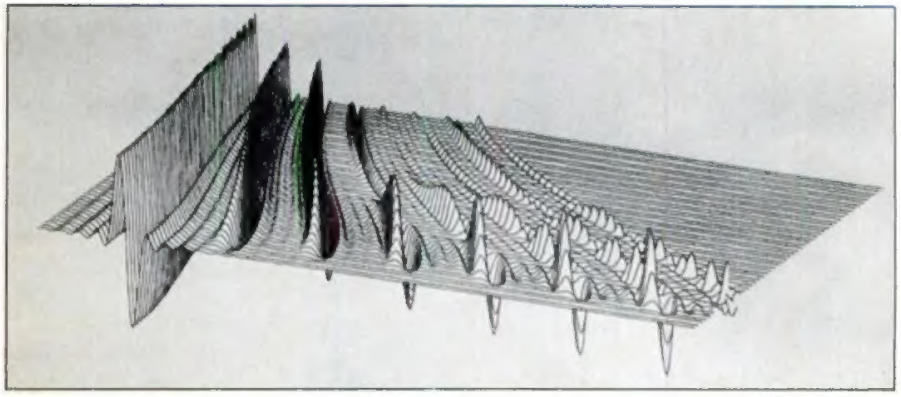
The *dBASE II* program allows seven indexes that speed the search for a particular piece of information. *Tech Journal* will show you how to increase the number of indexes—and maintain them easily.

The dBASE II Aftermarket

Program, screen, report, and graphics generators, utilities and a C-to-*dBASE II* interface: in-depth, technical reviews of more than 15 products.

The Independent Guide to IBM Personal Computers

Coming Up



PC Laser Simulation

The free-electron laser is one of the hottest new developments in the laser field, promising a unique combination of high power, high efficiency, and adjustable output wavelength. Here's the story of how one professor is using hard-disk-equipped PCs to simulate the operation of free-election lasers under a variety of conditions.

Clone Your Own PC

You *can* build your own PC-compatible computer from a printed circuit bareboard, but the project may be more of a hassle (and an expense) than you would expect. *PC* will take you through the steps of building your own micro and answer the ultimate question: Is it worth it?

The Floppy Disk Challenge

Energy sources, X-rays, magnetism, microwaves, lasagne: Exposure to any of these things poses potential hazards to a floppy disk—or does it? Howard Karten will test these and other alleged dangers to information stored on disk and give a verdict on how to avoid "The Floppy Syndrome."

DBMS Packages

PC continues its six-part series of reports reviewing the 65 database management software packages on the market today. In part 3, we take a look at the lowest level of database systems—those that act as electronic file boxes.

The PC as an Investment Tool

Did you ever plan to make a million on the stock market, but end up losing your shirt instead? Now that you've invested in a PC, you can increase your chances of being a winner on Wall Street with software packages that tell you when the time is right to buy and sell those unpredictable securities.

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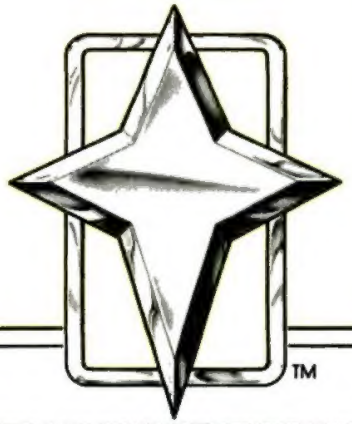
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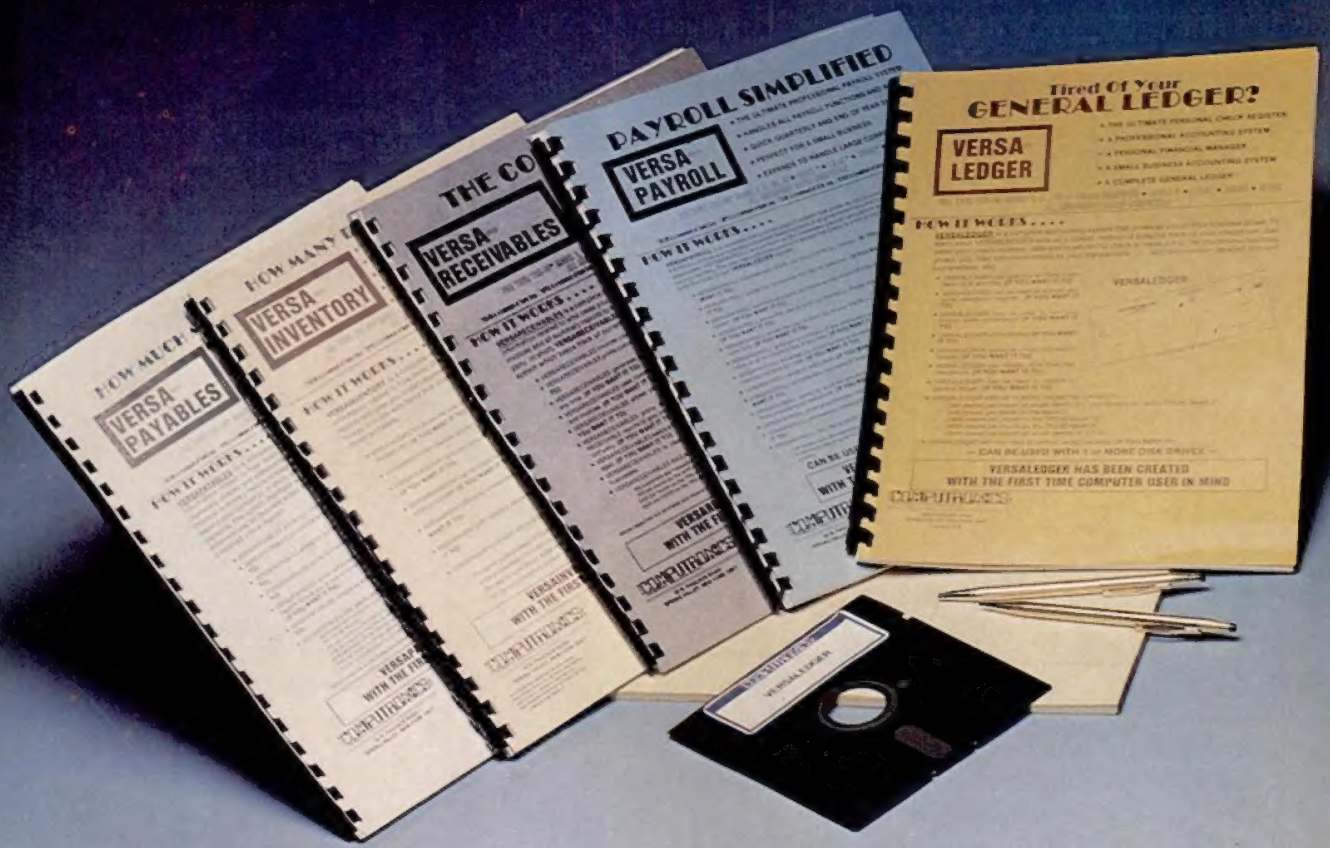
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